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Dissertation

Teachers' Conceptions of Student Information Literacy Learning and Teachers' Practices of Information Literacy Teaching and Collaboration with the School Library:

A Grounded Case Study

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Abstract

School librarians are expected to interact with teachers for enhancing student information literacy (IL) but library and information science (LIS) professionals around the world report low numbers and low levels of collaboration. In Germany, a country without a well-developed system of school libraries, the situation is particularly challenging. The teachers' perspective on both information literacy teaching and collaboration with the school library has been neglected in research. Given these gaps in knowledge, the present study took an interpretative, qualitative approach for gaining an in-depth understanding and developing a theory about the process of information literacy teaching in a faculty in an independent high school in the USA. The process of information literacy teaching was investigated in terms of teachers' conceptions of student information literacy learning (Research Question 1), the information literacy competencies covered in the research tasks teachers assign (Research Question 2), teachers' pedagogical interventions (Research Question 3), and teachers' collaboration with the school library (Research Question 4).

In this case study, which used an embedded single-case design as proposed by Yin (2009), data were collected *about* teachers in semi-structured individual interviews with administrators, the head school librarian, and a focus group discussion with students, and *from* teachers in a questionnaire with mainly open-ended questions and semi-structured individual interviews. During analysis, predominantly procedures from grounded theory according to Corbin and Strauss (2008) were employed. The theory was presented in the form of claims and sub-claims. For ensuring the transferability of findings to other settings, the context of the study was described in detail.

The concept of information literacy emerged out of the study in the form of the following seven categories: executing a research project as a process composed of a sequence of steps, using information technology (IT), finding information, controlling information, building knowledge, using information in ethical ways, and presenting information. Teachers were found to perceive of an information literate student in the first place as one who is able to evaluate information and then also as one who can find and analyze information. The majority of teachers teach information literacy, predominantly through the assignment of research tasks, which cover especially the use of information technology, information finding,

knowledge building, and information presentation. Teachers make use of the library as a space or work with librarians, and both teachers and librarians provide pedagogical interventions at the whole-class level as well as individual assistance about information literacy. The scope of research tasks and subjects partly shape information literacy competencies covered, collaboration, and pedagogical interventions.

Implications for practice are that librarians do not need to consider themselves as the only ones responsible for information literacy teaching in formal education, and that the two professional groups should agree on common understandings of the concept and common goals. Teachers and librarians can use the seven information literacy categories identified in this study as a tool for evaluating information literacy activities on an individual level, and, together with principals, for evaluating activities on the institutional level. In Germany, the seven categories partly intersect with definitions of media literacy, the predominant concept in the country, but also add to them so that the two should be combined rather than regarded as competing. The findings that high-quality library sources were prevalent and school librarians provided pedagogical interventions not only about information finding but about the majority of information literacy competencies (all except IT use) when students undertook extended research projects strengthens the proponents of a library and a well-trained, certified school librarian within the school building. As long as these are missing, a priority for German public and academic libraries should be to provide students and teachers in their community with easy access to high-quality sources from within the school building and to offer training on them in the school building. Also, teachers need to be particularly well prepared for providing the interventions that are necessary when their students engage with information.

This study was among the first to investigate teachers' approaches to information literacy teaching and their interaction with the school library and librarian in this context not only with frequent collaborators but with an entire faculty. More research on this subject is needed. In a first phase, more qualitative investigations should be undertaken for strengthening or refining the theory developed in this study, for example, in the form of multiple-case studies or action research, then, in a second phase, the theory should be tested in quantitative studies with large, randomly selected samples. Another major contribution of the present study to the field of library and information science is that it illustrates that information literacy teaching in formal education is a highly complex endeavor.

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[1] A fictitious name

I left a Belgian school library project for undertaking this research. I would like to thank the whole staff of the Leonardo-Mediothek for their engagement and support so that I could take up this new journey, being assured that our project was well looked after. I would also like to thank the principal of the Bischöfliche Schule, Engelbert Cremer, and all other colleagues, in particular Jean Werding and Alfons Thunus, who encouraged me to undertake this scientific research.

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I dedicate my dissertation to my father who had to leave this world far too early but instilled in me an almost insatiable thirst for lifelong learning.

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Abbreviations

AASL	American Association of School Librarians
ACRL	Association of College and Research Libraries
AECT	Association for Educational Communications and Technology
AGIK BAY	Arbeitsgemeinschaft Informationskompetenz des Bibliotheksverbunds Bayern (*Bavarian Information Literacy Working Group*)
ALA	American Library Association
ANZIIL	Australian and New Zealand Institute for Information Literacy
AP	Advanced Placement
BITKOM	Bundesverband Informationswirtschaft, Telekommunikation und neue Medien e. V. (*Federal Association for Information Technology, Telecommunications and New Media*)
CAUL	Council of Australian University Librarians
DBV	Deutscher Bibliotheksverband e.V. (*German Library Association*)
DGI	Deutsche Gesellschaft für Informationswissenschaft und Informationspraxis e.V. (*German Society for Information Science and Information Practice*)
DMU	De Montfort University
DYMIK	Dynamisches Modell der Informationskompetenz (*Dynamic Model of Information Literacy*)
ES	Elementary school
FTE	Full-time equivalent
HS	High school
ICT	Information, Communications, and Technology
IFLA	International Federation of Library Associations and Institutions
IL	Information Literacy
ILILE	Institute for Library and Information Literacy Education
ISP	Information Search Process
IT	Information Technology

K-12	Kindergarten through grade 12
LIK	Lernsystem Informationskompetenz (*Information Literacy Learning System*)
LIS	Library and Information Science
MIL	Media and Information Literacy
MLIS	Master of Library and Information Science
MS	Middle school
NAIS	National Association of Independent Schools
NIK-BW	Netzwerk Informationskompetenz Baden-Württemberg (*Information Literacy Network Baden-Württemberg*)
PISA	Programme for International Student Assessment
SCONUL	Society of College, National and University Libraries
SS	Secondary school
TCNJ	The College of New Jersey
UK	The United Kingdom of Great Britain and Northern Ireland
USA	The United States of America

1. Introduction

This chapter of the report provides a brief overview of the present study. In the first section, the broader problem as well as the deficiencies in the existing knowledge that lead to this investigation are described, and the contribution of the latter in filling those gaps. In the next section, the purpose of the study, the conceptual framework that underpinned the study, its methodological approaches, and the research questions are briefly explained. This chapter concludes with an outline of the structure of the report.

1.1 The Research Problem

What do different professional groups know about each other? As far as school libraries are concerned, what do teachers know about librarians? And of particular interest to the present study: What do school librarians know about classroom teachers? School librarians have long been expected to work closely with faculty, a request that has become even stronger with the advent of new information technologies (IT) and the dissemination of the concept of information literacy (IL) that followed, and particularly with a shift in teaching approaches from behaviorist to constructivist.

Information literacy has been defined in multiple ways: as the acquisition of skills and abilities related to information location, evaluation, and use (Doyle, 1992), as concepts that are prerequisites for learning and constructing individual knowledge from information in a variety of formats (Kuhlthau, 2004), as the use of information for a purpose (Todd, 2005a) in a particular context (Lundh & Limberg, 2008), as varying experiences and the ability to select and use the appropriate approach when needed (Bruce, 1997), as critical information literacies (Hapke, 2012; Kapitzke, 2003b), or as a combination of those (Bruce, Edwards, & Lupton, 2006). Across countries, the development of information literacy is considered as crucial for students; they need it for their life at school, from primary to tertiary level, for their private and working lives, as well as for their active participation in a democratic society. From a constructivist perspective Kuhlthau (2004) writes:

> The challenge for the information age school is to educate children for living and working in an information-rich technological world. The three basic charges of education in a free society are to prepare students for the workplace, citizenship, and

> daily living. ... Basic to meeting these three charges is developing student competence in learning in information-laden environments and in finding meaning in a variety of sources of information. All three charges involve a process approach to information seeking and information use that underlie information literacy. (pp. 145–146)

At the same time, numerous authors have reported weaknesses in students' information literacy, at secondary level as well as at tertiary level or both (Combes, 2008; Gorski, 2008; Gust von Loh & Stock, 2013; Schreiber & Sommer, 2005; Ladbrook & Probert, 2011; Meyers & Eisenberg, 2008; Tappenbeck, 2012; Todd, 2003a; Walraven, Brand-Gruwel, & Boshuizen, 2008). There is strong recognition that students cannot be expected to develop information literacy naturally on their own. Talking on a most general level, Wilson (1994) observes:

> All information-seeking behaviour is learned, nothing is innate: even the ways in which informal communication networks are used to get information must be learned through the normal interaction by which we all learn to function in a community, a work-place, a professional group, or whatever.

Information literacy needs to be addressed formally and explicitly in teaching (Ballod, 2007; Gapski & Tekster, 2012a; Limberg & Sundin, 2006; Moore, 2002; Probert, 2009; Todd, 2003b). Librarians are requested not only to participate but also to take the lead in activities for enhancing student information literacy development, especially in a constantly changing information technology environment; moreover, librarians should work on this together with classroom teachers (American Association of School Librarians, 2009a; *Bibliothek und Information Deutschland*, 2011; Dannenberg, 2000; Todd, 2008; Umlauf, 2005a; Umlauf, 2005b). There is plenty of evidence that such collaboration has positive impacts on student learning (Achterman, 2008; Lance, Rodney, & Hamilton-Pennell, 2000b; Lance, Rodney, & Hamilton-Pennell, 2000a; Lance, Rodney, & Hamilton-Pennell, 2005; Lance & Loertscher, 2005; Lance & Schwarz, 2012; U.S. National Commission on Libraries and Information Science, 2008; Smith, 2006c; Todd & Kuhlthau, 2005a; Todd & Heinström, 2006a; Todd, 2012). But what about teachers, have they already become engaged in individual information literacy teaching, and if so, to what extent? Also, what is happening in classrooms and what do librarians know about it?

Teachers are important for student learning. From his synthesis of over 800 meta-analyses about influences on student learning, Hattie (2009) concluded that "teachers are among the most powerful influences on learning" (p. 238), with about 30% of the variance in student learning being attributed to them; earlier Hattie (2003) explained that "it is what teachers

know, do, and care about which is very powerful in this learning equation" (p. 2). As far as information literacy is concerned, from a practical perspective, the teachers' contribution is of importance as they decide on and set activities and tasks (Williams & Wavell, 2007, p. 200). Henri (2001) argues:

> The key agent in the fight for information literate schools is the teacher. The teacher is at the front line working with students on a day to day basis and influencing student expectation and behaviour. As teaching practice changes from teacher focused quantitative approaches to student centred and more qualitative approaches the importance of the teacher as role model and mentor becomes paramount. (p. 119)

The information literacy of teachers matters as well as their awareness of the importance of information literacy. They can influence students' use of an information literacy model. Deliberately or not, teachers act as role models, and they make the decision to collaborate with librarians on this matter (Henri, 2001, pp. 120–121). Collaboration has been brought forward by library and information science (LIS) professionals; however, teachers have not been asked if they want to share the endeavor or under which circumstances. Todd (2005b) observes:

> Contemporary school librarianship literature is based on the assumption that there should be a strong and positive collaborative relationship with classroom teachers, with mutual planning, design, implementation, and evaluation of instructional interventions to ensure that students develop the appropriate cognitive, behavioral, and affective scaffolds for finding and using information in their learning tasks. Whether this role is actually endorsed by classroom teachers has never been determined. (p. 90)

Librarians around the world report low numbers and/or low levels of collaboration with teachers, especially if whole faculties are taken into account (Loertscher, Koechlin, & Zwaan, 2005; Smith & Hepworth, 2007; The Parliament of the Commonwealth of Australia. House of Representatives. Education and Employment Committee, 2011; Todd & Heinström, 2008; Todd, 2005b; Todd, Gordon, & Lu, 2010; Williams & Wavell, 2006a). The situation is particularly challenging in countries that do not have a well-developed network of school libraries, and Germany is one of them. There is no unanimity about the exact number of school libraries in Germany. The study undertaken in the context of the *Programme for International Student Assessment* (PISA) in 2009 reported that 79.9% of the 15-year old German students have a library in their school, compared to 95.6% in the USA (*PISA 2009 Ergebnisse*, 2011), whereas the National Report on Education (*Deutscher Bildungsbericht*, 2012) found - based on reports from principals - that only 66.4% of schools have a library

(*Autorengruppe Bildungsberichterstattung*, 2012). No other empirical research has formally established the situation of school libraries in the country since 1970 (Schuldt, 2006, pp. 12). But neither the PISA study nor the National Report on Education provides any information about the quality of the libraries. German school libraries are said to range from mere loan libraries in the basement of a school to high performing multimedia information centers (Schlamp, 2013, p. 20), and include book corners, separate collections for students and teachers, or classroom collections (*Expertengruppe "Bibliothek und Schule" des DBV*, 2005). According to estimates, between 10-20% of schools have a permanently working school library (Schuldt, 2006, p. 14) or one that is in accordance with professional standards, although these standards have never been formally established (Schneider, 2009, pp. 506; 510).

Reasons for this situation in Germany are (1) the lack of clarity regarding the legal situation of school libraries, the public authority that is responsible for the libraries, and the attitude and position of public libraries towards school libraries, (2) the federal structure of the country because the support for school libraries varies considerably across German States (*Länder*) (Schuldt, 2006, pp. 13–16), (3) the availability of excellent textbooks, (4) the constraint of teachers to cover too much content and the lack of time for doing preparations, (5) high investments in the schools' but not the library's information technology, (6) the recent changes in the education system with the aim of reducing the overall time students spend at school without reducing the content to be covered, and still requiring standardized testing, and (7) the fact that public libraries are responsible for setting up and running school libraries (Schlamp, 2013, pp. 20–23). Other causes include the German tradition of part-time schooling and the separation between learning in formal school settings and individual education (*Bildung*), teacher-centered teaching methods, and school libraries not being integral part of teacher education; however, as a consequence of the first PISA study published in 2001, major changes are underway (Schneider, 2009, p. 507).

German school libraries may be managed by trained public librarians (Schuldt, 2006, p. 17), but typically they are run by part time and often volunteer staff, including teachers, parents, or students; also, there is no formal training program for school librarians (Schneider, 2009, p. 506). Collaboration with teachers for enhancing student learning becomes extremely challenging under such circumstances. Fritz (2013) observes that high-level librarian-teacher collaborations, during which they plan and teach units together as equal partners, do not exist in Germany; instead, collaboration or rather cooperation takes the more superficial form of

agreements between public libraries and schools (p. 152). As a consequence, teachers play an even more important role in information literacy teaching. A new challenge in countries with more developed school library systems is the recent trend towards decreasing the amount of school librarian positions in the context of reducing public expenditures, which takes place across states in the USA but also in other countries. Although it is to be hoped that these are temporary and reversible measures, more responsibility regarding student development of information literacy will rest on teachers.

Not much is known about teachers and information literacy teaching. The necessity not only for undertaking more research but especially more in-depth research about teachers has been expressed by numerous researchers around the world: Lance, whose statewide studies in the USA showed that school librarian and teacher collaboration is one of the factors that positively impacts student learning, noted that the teachers' role in that collaboration has not been studied much (Lance, Rodney, & Russell, 2007, p. 4) and again five years later that "specific research about the role of ... teachers in school library impact on student performance is sparse" (Lance & Schwarz, 2012, p. 1). Todd stated that there is an urgent need to study inhibitors and facilitators of collaboration not only from the view of school librarians but also from that of teachers (Todd, 2005b, p. 24) and that "there is considerable lack of research investigating the specific dynamics of an extensive number of library media specialist - teacher collaborations" (Todd & Heinström, 2008, p. 4). Montiel-Overall also claimed that "few empirical studies" have investigated the specificities of librarian-teacher collaboration (Montiel-Overall, 2005a, p. 44; Montiel-Overall, 2008, p. 145).

As far as English-speaking countries outside the USA are concerned, Williams (2006a) noted:

> It is not clear how teachers' perceptions of what makes an 'information literate learner' compare with the information profession's models or how teachers' perceive information literacy to stand within the various priorities and demands that exist within the current educational environment. (p. 2)

Probert (2009) argued that there is "little research investigating classroom teachers' knowledge of information literacy skills and their related pedagogical practice" (p. 24) and Herring (2010) reported the lack of studies providing "an in-depth exploration of the views of ... school staff on information literacy skills" (p. 108). In Germany, Gapski and Tekster (2009) asserted that there is a low number of studies dealing with information literacy in the school context or teachers' own information literacy (p. 40). In France, Liquète (2001) reviewed studies between 1985 and 2001 and found that only a few of them addressed teachers'

documentation and information practices (p. 3). The situation is similar for tertiary faculty. Webber et al. (2005) found that "there has been no large-scale study of UK academics' conceptions of information literacy, nor of their conceptions of pedagogy for information literacy" (p. 4). McGuinness (2006) wrote:

> To date, the actual voices of faculty have been featured to only a marginal extent in LIS papers in general and in those dealing with IL in particular. ... Consequently, our knowledge and understanding of faculty attitudes towards, and perceptions of, information literacy development, have been shaped primarily by second-hand accounts of their behavior, relayed by the information staff who work with them. (p. 574)

And more recently, Saunders (2012) argued that "there have not been many systematic studies of faculty attitudes toward information literacy" (p. 227) and Badia (2013) noted that "information literacy is a popular topic in the library science literature, but few studies have looked at what faculty members think about information literacy" (p. 243).

Teachers are crucial for student development of information literacy; particularly fruitful is the endeavor, if they collaborate with librarians, who are, per se, information experts, but teachers' conceptions and practices regarding information literacy learning, teaching, and collaboration have so far largely remained a secret. This study makes a contribution to filling this gap. It may serve other researchers as a basis for more in-depth explorations about teachers and information literacy. Apart from participating teachers, for which it provides an opportunity to learn more about their own information literacy, the study may be of interest to various groups of practitioners: for (school) librarians who want to start or expand collaborative activities; for administrators who want to discover (new) ways of supporting single collaborative initiatives or for creating a whole school culture that is supportive to collaborative information literacy teaching; and for tertiary educators[2] who are responsible for librarian or teacher training it may point towards topics that need to be integrated into pre-service or in-service programs. Although the findings of this qualitative study cannot be generalized, the extensive description of their context will allow readers, including those in Germany, to judge about their transferability to other settings (Guba, 1981; Miles & Huberman, 1994), so that they may enrich and perhaps even intensify the discourse about information literacy teaching in Germany.

[2] In this dissertation, *educator* is used as a synonym for *teacher*.

1.2 Purpose and Approach of the Study; Research Questions

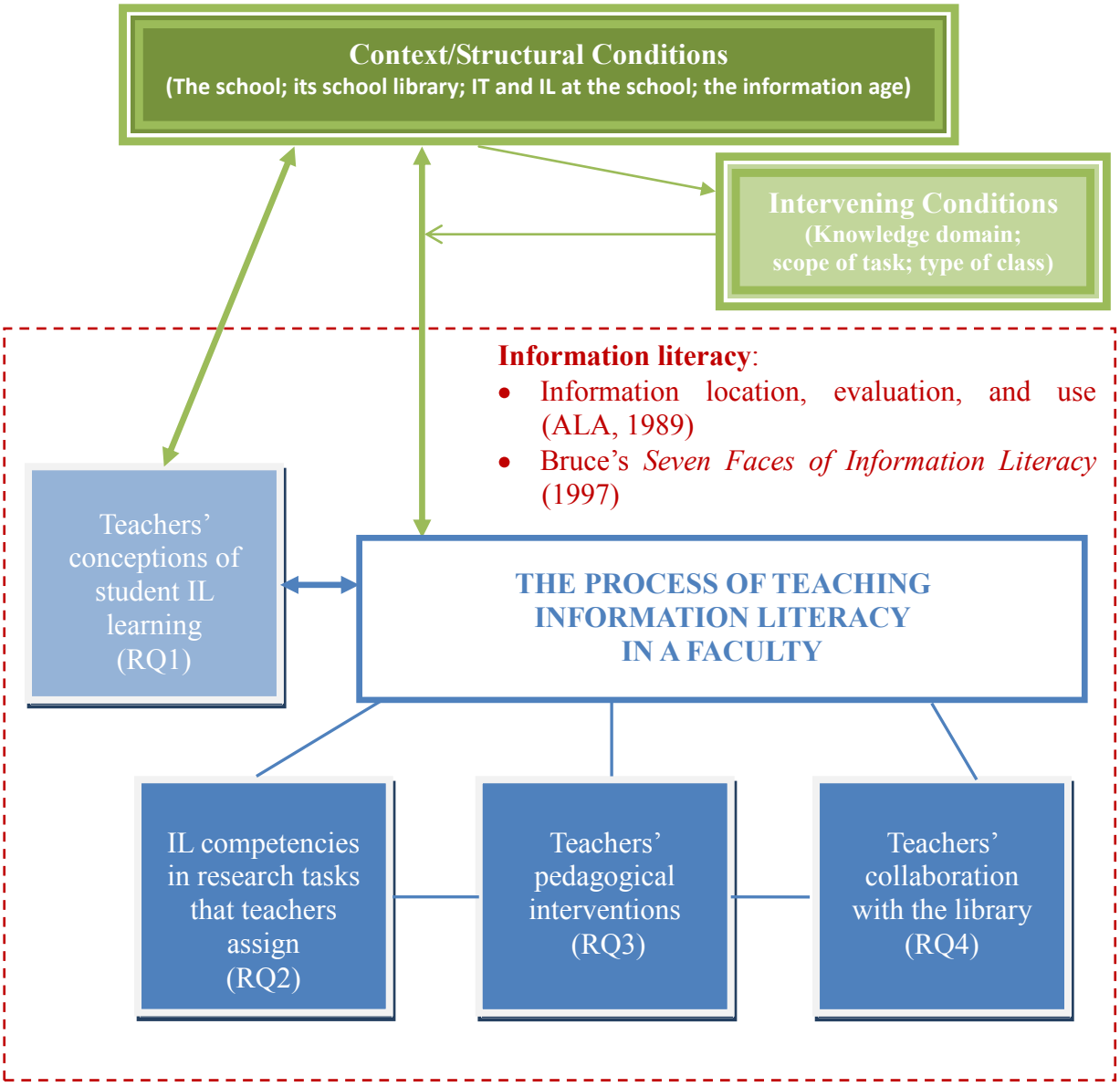
The purpose of the present qualitative case study was to gain an in-depth understanding of the process of teaching information literacy in a high school faculty, and to formulate a theory that is grounded in the data, based on the procedures suggested by Corbin and Strauss (2008). These authors define *process* as "ongoing action/interaction/emotion taken in response to situations, or problems" (p. 96). Actions/interactions/emotions can be progressive and occur in phases, levels, progression towards a goal, and sequences of action, but they can also be circular or chaotic (p. 98); moreover, they can be "strategic, routine, random, novel, automatic, and/or thoughtful" (p. 87). Process is closely related to context "because persons act in response to something, the something being the issues, problems, situations, goals, and events occurring in their lives" (p. 96). *Context* refers to conditions, which "explain why and how persons or groups respond in certain ways. Conditions might arise out of time, place, culture, rules, regulations, beliefs, economics, power, or gender factors as well as the social worlds, organizations, and institutions"; they may shape actions and interactions directly or indirectly, and in a, more or less, linear way (Strauss & Corbin, 1998, pp. 130–131).

The conceptual framework underlying this grounded case study is displayed in Figure 1-1. It provides an overview of the key constructs or concepts that were investigated, relationships among them, and the people that were studied (Miles & Huberman, 1994, pp. 18–25). The framework was more rudimentary at the very beginning of the study and comprised other elements. One of the main characteristics of qualitative methods is that they are aimed at developing hypotheses or claims instead of testing them so that they address a phenomenon from participants' perspective (Creswell, 2008, p. 139). As a consequence, the version of the conceptual framework that is presented here is the one that evolved during the study (Miles & Huberman, 1994, p. 21).

The actions and interactions taken in a faculty for teaching information literacy are responses to contextual conditions (Corbin & Strauss, 2008, pp. 87-102), which include the school, the school library, information technology and information literacy at the school, and the information age. Context shapes actions but is itself also shaped by them. The process or practices of information literacy teaching were investigated in terms of information literacy competencies in the research tasks that teachers assign, teachers' pedagogical interventions, and their collaboration with the school library and librarian. Teachers' practices of teaching are influenced by conceptions of learning (Hallet, 2009, p. 3; Kuhlthau, Maniotes, & Caspari,

2007, p. 13), so that they were also included in the study. *Intervening conditions* is a term borrowed from Corbin and Strauss' (1998) and expanded in this study for describing factors that interfere with other (structural) conditions and shape teachers' actions and interactions; intervening conditions are partly shaped by structural conditions.

Figure 1-1: Conceptual Framework of the Study



At this point in the report, only a brief explanation about the concepts in the figure and their relationships are provided; details will be given in the literature review (Chapter 2). The concepts of information location, evaluation, and use, as included in the widely recognized ALA definition (American Library Association/Presidential Committee on Information Literacy, 1989) and in the majority of definitions that have appeared thereafter, were employed for referring to information literacy in preliminary research questions and in all

instruments. The decision to use Bruce's (1997) information literacy model was taken during analysis of the pilot data when more and more of the information literacy concepts that emerged out of the data appeared to be related to most of the seven conceptions in her model. It was not imposed on the data but used as sensitizing frame for the analysis (Corbin & Strauss, 2008, p. 35), so that in the figure doted lines are used.

The following research questions, again the final version is presented here as they evolved during the study, were used for gaining a deep understanding of the process of information literacy teaching in a faculty:

1. What are teachers' conceptions of student information literacy learning and learners?
2. What information literacy competencies, if any, are encompassed in the research tasks that teachers assign?
3. Which pedagogical interventions, if any, do teachers use when they teach information literacy?
4. How do teachers work with the school library and school librarians, if at all, when they teach information literacy?

Data were collected in semi-structured one-on-one interviews with four administrators (including the head school librarian), a semi-structured focus group discussion with six students, questionnaires with mainly open-ended questions completed by 26 teachers and semi-structured one-on-one interviews with 11 teachers. Data from administrators and students formed the external perspective and those from teachers the internal perspective. Data about the context were gathered from the aforementioned sources and, in addition, in documents and informal conversations.

1.3 Structure of the Dissertation

In concordance with the emergent design of this study, the sequence of chapters cannot be taken as an indication for a rigid chronology or linearity of the steps involved in this research process.

Chapter 2 is divided in two parts. It begins with a critical discussion of theoretical frameworks, models, definitions, terms, standards, beliefs about information literacy, information literacy learning, information literacy teaching, and school librarian–teacher

collaboration in this context. The second part reviews major research about teachers and information literacy; it encompasses studies about teachers' conceptions of student information literacy learning, about teachers' conceptions and practices of information literacy teaching, and about teachers' collaboration with the school library.

Chapter 3 explains the research methods that were employed. It provides the rationale for using a qualitative case study design together with analytical procedures from grounded theory, describes the procedures for selecting the case and within-case samples, the lessons learned from the pilot study, and the procedures of data collection and analysis. Given its importance for the present study, a detailed description of the context is included in this section, which ends with a discussion of the limitations of the study and the strategies employed for enhancing its trustworthiness.

Chapter 4 reports the findings of the investigation, research question by research question and in the form of statements of claims and sub-claims, supported by summarizing matrices, detailed narratives of the evidence, and a selection of exemplary quotes. Each of these sections closes with a summary, which includes an overview of the strength of sub-claims as well as some important statements on a more general level. At the end of the chapter the key findings are outlined.

Chapter 5 interprets and discusses the findings in the light of their context (as described in Chapter 3) and the literature (as reported in Chapter 2), draws conclusions for the study site, and discusses the transferability of findings to other settings in general and in Germany in particular. The chapter ends with suggestions for further research and reflections about the overall significance of this study.

2. Review of the Literature

In general terms, the aim of a literature review is to determine the current state of knowledge, findings, and conceptions regarding the topic and to identify convergences and divergences as well as omissions; it usually is a justified selection of the available literature (Umlauf, 2013). Apart from the identification of gaps in themes and methodologies, which is common to both quantitative and qualitative studies, the literature review has another function in qualitative than in quantitative research. In the latter, which typically uses deductive designs, it is highly directive as it helps to identify the theory that will be tested and to formulate hypotheses prior to the beginning of the study. In the former, which typically uses inductive designs, it may also be used for developing preliminary research questions and questions in research instruments but with a much more open stance, which allows participants' perspectives to emerge and to develop hypotheses as an outcome of the study (Creswell, 2008, pp. 89–90). The present study used a qualitative case study approach combined with grounded theory according to Corbin and Straus (2008) who note:

> There is no need to review all of the literature in the field beforehand, as is frequently done by researchers using quantitative research approaches. It is impossible to know prior to the investigation what salient problems or what relevant concepts will be derived from this set of data. There is always something new to discover. ... Also, the researcher does not want to be so steeped in the literature that he or she is constrained and even stifled by it. (pp. 35-36)

Although the literature is presented at the beginning of this report and an important amount of the literature was reviewed before the beginning of the empirical part and excerpts had been produced, the literature review was expanded with the emergence of new concepts during the analysis. Also, the empirical part brought the focus so that from the huge amount of reviewed literature pertinent information could be selected for the actual writing of the report. Corbin and Strauss further note that the literature can be used for developing initial questions in research instruments, and that during analysis, familiarity with the literature can lead to a higher level of sensitivity towards the data and concepts found in the literature can be used for making comparisons, as long as the investigator makes sure not to impose them (p. 37). The present study made use of the literature in these ways as will be described below (Chapter 3). At the end of this report (Chapter 5), the findings of the present study are compared and contrasted with the literature (Corbin & Strauss, 2008, p. 37; Creswell, 2008, pp. 89–90).

Scientific studies, predominantly as described in peer-reviewed journals but also in books and documents available in institutional archives, play a central role in this literature report; they are the sole type of sources in the second part, which addresses research about teachers. The first part, which deals with theoretical frameworks, models, definitions, and beliefs, utilized theoretical articles or documents, handbooks, encyclopedia, conference proceedings philosophical papers, practice reports, and professional guidelines or other professional documents. The vast majority of the literature is from the LIS field complemented by literature from other disciplines, for example, education science, psychology, or communication science. Literature from Anglo-American countries, including the USA, the UK, and Australia, plays a predominant role because the present study took place in the USA. It is supplemented by key texts from other countries, including Germany, New Zealand, Canada, and Sweden; among these, German texts are of particular interest because the present study took place in the context of a doctoral program at a German university.

2.1 Chapter Overview

The critical review of the literature is divided in two parts. The first part begins with a section about major definitions of information literacy as expressed apart from, but also within models and standards. It is followed by three shorter sections: one that deals with information literacy learning, one that addresses information literacy teaching, and a third one that discusses crucial texts regarding collaboration between school librarians and teachers.

Learning and teaching are separated in this report because they represent two different sides of a coin; Hallet (2009) observes that an understanding of the concept of learning and a clear conception of the type of (learning) processes that are intended to be initiated is a prerequisite for successful teaching (p. 3). Kuhlthau et al. (2007) write that "every educator has a theory of learning that forms the basis of the instruction and the learning environment he or she provides for students" (p.13). As far as information literacy is concerned, Limberg and Sundin (2006) note that "an understanding of the practices of teaching information seeking requires a view of the interdependence of the two perspectives of teaching and learning", and Bruce et al. (2006) argue that "peoples' approaches to IL and IL education are informed by the views of teaching, learning and IL which they adopt either implicitly or explicitly in different contexts" (p. 1).

Important differences between German-speaking and English-speaking countries exist regarding the use of concepts related to teaching and learning in general, and to information literacy as well as media literacy teaching and learning. One major difference pertains to the use of the words *didactics* and *pedagogy*. *Didaktik* is a concept that has its roots in Germany, in the 17th century; from there it spread to other European countries and is currently used in the context of education especially in German-speaking countries, Central Europe, and Scandinavian countries (Kansanen, 1995, pp. 347–348). It seldom appears in Anglo-American countries and if it is used in North America at all, it is often with "a contemptuous nuance" (Kansanen, 2002, pp. 427; 431). Didaktik is translated into English as *didactics* (Kansanen, 2002, p. 430) but depending on whether the emphasis is on its normative or descriptive aspect, it could also be translated either as "art of teaching" or "research on teaching" (Kansanen, 1995, p. 348). It is defined as "a model or a system of how to envisage the teaching-learning process as well as a kind of metatheory where the various models can be compared with each other" (Kansanen, 1995, p. 348) or "as a methodical study of pedagogical sciences ... [and as being] concerned with teaching and learning processes in different cultural and cross-cultural settings" (Zajda & Zajda, 2008, p. 169). It is especially used in teacher education (Kansanen, 1995, p. 348).

Kansanen (2002) considers didactics as partly synonymous with *pedagogy* (p. 430) and Hamilton (1999) notes that the "recent Anglo-American usage of 'pedagogy' mirrors the mainland European use of 'didactic'" (p. 148). In *The Routledge International Encyclopedia of Education*, pedagogy is defined as "the general principles of effective teaching, entailing a complex blend of theoretical understanding, practical skills and competencies" and as describing "either the science (theory) or art (practice) of teaching that makes a difference in the intellectual and social development of students" (O'Neill, 2008, p. 429). In Germany, didactics is considered as the narrower, integrating aspect of the broader concept of pedagogy (Peterßen, 2001, p. 19). However, as the present report describes a study that took place in a school in the USA and is written in English, pedagogy is used instead of didactics.

As far as the use of *didactics* and *pedagogy* with regard to information literacy and related literacies is concerned, the concept of *media pedagogy* is well established in Germany, whereas it is less used in the UK and even more sparsely in the USA, where instead the concept *media literacy pedagogy* appears in the literature (Wijnen, 2008, pp. 126–128) and especially, though with different connotations, *media literacy education* (Wijnen, 2008, pp. 107–111). In Germany, the term *media didactics*, which deals with the planned,

purposeful and reflected use of non-personal media for pedagogical purposes (Hoffmann, 2003, p. 346), is also widespread. *Information didactics* on the other hand, which was introduced by Schulz in the early 1990s as a theory of teaching and learning regarding information literacy, is not commonly used (Rauchmann, 2009, p. 73), although an important step was undertaken by Ballod (2007) who, based on language didactics, laid the foundations for the development of information didactics. Even the recent textbook published by Hanke et al. (2013) with the aim of helping academic librarians to improve their pedagogical abilities, does not make use of the term. Better established are the broader concept of *library pedagogy*, which deals with conceptions and methods for user-centered education in libraries in terms of literacy in general, that is, competencies of reading and writing, and information literacy in particular (Homann, 2011a-2013), and *teaching library*, which refers predominantly to libraries developing an encompassing, "all inclusive" concept in terms of definition of goals and institutional prerequisites, for example, staffing and space, for enhancing information literacy in formal education, as part of the curriculum and integrated with subject content, using user-centered, problem-oriented and activating pedagogical strategies, and assessing student learning (Rauchmann, 2009, pp. 74–75).

The second part of the literature report discusses major research about teachers and information literacy, including studies about teachers' conceptions of student information literacy learning, as well as teachers' conceptions and practices of information literacy teaching and collaboration with the school library; it ends with the identification of gaps in themes and methods. While the overall focus of the chapter is on secondary schools, important literature about primary and tertiary education is also included.

2.2 Part 1: IL Theories, Models, Definitions, Beliefs, Terminology

The first part of the critical literature review discusses theories, models, definitions, and beliefs about practice regarding information literacy, information literacy learning, information literacy teaching, and collaboration between school librarians and teachers for information literacy teaching. It also addresses differences in terminology between the German and the English language.

2.2.1 Defining Information Literacy (IL)

The concept of information literacy appeared in the middle of the 1960s, when secondary and tertiary librarians discussed their role in the context of the emergence of computers in education; apparently Paul Zurkowski was the first to use the term in the USA in 1974 (Bruce, 1997, p. 4). Zurkowski, president of the Information Industry Association, in a report to the National Commission on Libraries and Information Science recommended the implementation of a program that would help the entire US population become information literate within a decade, that is, to be able to use information resources, especially primary sources, and information tools for problem solving (Zurkowski, 1974, p. 6). The concept won wider attention and recognition, not only in the USA but also internationally, particularly after the release of the *Final Report* of the American Library Association (ALA) Presidential Committee that consisted of leaders in education and librarianship and that had been appointed two years earlier, among others, to provide a definition of information literacy (Bruce, 1997, p. 4; Callison & Preddy, 2006, p. 22; Chevillotte, 2009, p. 2421). In addition to the following definition, "to be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association/Presidential Committee on Information Literacy, 1989), the Committee emphasized the crucial role of information literacy for people in their individual lives, for businesses, and for a democratic society. The ALA definition has been acknowledged and used as a basis for later definitions throughout the world (Balceris, 2011; Chevillotte, 2009, p. 2421; Eisenberg, Lowe, & Spitzer, 2004, p. 4; Ingold, 2005, p. 32; Owusu-Ansah, 2005, p. 367; Probert, 2008, p. 1; Rauchmann, 2009, p. 59; Weisel, 2007, p. 209), including German-speaking countries (Germany, Austria, Switzerland), where information literacy appeared in the LIS literature only at the end of the 1980s and became a major topic of interest over an entire decade later than in the USA (Homann, 2000b, p. 977), that is, at the end of the 1990s (Ingold, 2005, p. 20; Lux & Sühl-Strohmenger, 2004, p. 36). In the USA and the UK information literacy initiatives started in the school context (Bruce, 1997, p. 7), whereas in Germany they began in higher education (Homann, 2008, pp. 83–87; Virkus, 2003).

While numerous writers have pointed towards the variety of information literacy definitions and the complexity of the concept, others have identified similarities. Belonging to the latter group, Owusu-Ansah (2003; 2005), reviewing information literacy definitions from the practical perspective of instruction librarians in academic institutions, found a "definitional

consensus and resulting conceptual certainty" (p. 367) because the vast majority are based on the one provided by ALA in 1989, and he called for a concentration on the exploration of the best ways to realize information literacy education and to attain information literacy. Pointing in the same direction, Williams and Wavell (2007) noted that the LIS community has developed a considerable amount of information literacy definitions, "all variations on the ability to engage effectively in a process of defining information need, evaluating, selecting and synthesizing information from a range of sources, and applying the information to the task or problem in hand", variations being the result of differences in contexts and priorities (Williams & Wavell, 2007, p. 199). Belonging to the first group, Kapitzke (2003a) asserted that meanings and definitions of information literacy have not been fixed and that there is no agreement on the theoretical as well as practical dimensions of the concept. From her encompassing overview, Ingold (2005) also concluded that there is no agreement in the LIS literature, but rather there is a plethora of definitions with varying perspectives, emphases, and levels of detail. She also deplored that the concept lacks a solid theoretical and empirical foundation (Ingold, 2005). Writing about the school context, Herring found that there are contradictions rather than a consensus as far as the understanding of information literacy and the information literacy competencies of a student who is considered as information literate are concerned (Herring, 2010, p. 28). In her entry about the concept of information literacy in the *Encyclopedia of Library and Information Sciences*, Chevillotte observed that "numerous authors have formulated their own definitions and there seems to be almost as many ways of defining information literacy as there are authors writing articles about it", especially LIS professionals. In addition, she underlined the complexity and evolving nature of the concept (Chevillotte, 2009, pp. 2422–2424). Todd (2000b) highlighted "the multidimensional nature of the collective consciousness of information literacy" and the variety of underlying philosophical assumptions and Kerr (2010) explained part of the differences with the fact that the majority of information literacy definitions are anchored either in the behaviorist, the constructivist, or the relational paradigm (Kerr, 2010, p. 20).

Information literacy is defined partly through models and standards; before these will be discussed, a few important other definitions are reviewed. An older definition that has frequently been cited (Eisenberg, Lowe, & Spitzer, 2004; Ingold, 2005; Moore, 2002; Rauchmann, 2009; Williams & Wavell, 2006b) and played a major role in the development of models and standards is Doyle's expanded version of the ALA definition, which she developed through a Delphi study with 136 participants from 18 different organizations,

especially from the field of education, in the USA, Canada, and Puerto Rico in 1991-92, and which consists of ten behavioral attributes (Doyle, 1992):

> An information literate person is one who:
> - Recognizes the need for information
> - Recognizes that accurate and complete information is the basis for intelligent decision making
> - Formulates questions based on information needs
> - Identifies potential sources of information
> - Develops successful search strategies
> - Accesses sources of information including computer-based and other technologies
> - Evaluates information
> - Organizes information for practical application
> - Integrates new information into an existing body of knowledge and
> - Uses information in critical thinking and problem solving. (p. 2)

Based on the work of Doyle and other scholars, Bruce (1994) identified "seven key characteristics" according to which an information literate person

- Engages in independent, self-directed learning
- Uses information processes
- Uses a variety of information technologies and systems
- Has internalised values that promote information use
- Has a sound knowledge of the world of information
- Approaches information critically and
- Has a personal information style that facilitates his or her interaction with the world of information (pp. 10-11)

The two descriptions of an information literate person vary considerably. Doyle defines information literacy in terms of a rather linear process for which particular attributes or skills are needed; her description includes knowledge building, but only in terms of a skill or a step. Bruce, on the other hand, perceives of information literacy as a way of learning from information resources and emphasizes the individuality of the process, the responsibility of each individual, and the role of values.

In addition to Bruce, numerous other authors also move beyond the skills approach and emphasize the information part of the concept. Todd (2000a, 200b) defines information literacy as actively engaging and interacting with information, using information for a purpose, and building new knowledge. Taking a socio-cultural perspective, Kapitzke (2003b) argues that information literacy is not an autonomous, neutral, universally applicable concept but "context-sensitive, and ... enabled and disenabled by the discursive and political conditions of individual library [and school] contexts" (p. 6). Limberg et al. (2012) state that,

on the one hand, information literacy is shaped by its context, and, on the other hand, it shapes its context; they define it as "learning to communicate appropriately within a specific practice" (p. 104). Lloyd (2006), writing about workplace information literacy, moves beyond the notion of practice and uses the concept of landscape for referring to the information environment; landscapes do not only include practices but also activities, artifacts, opportunities, and symbols. She offers the following definition:

> Being information literate is a state of knowing about the information landscape, achieved through a relationship with information, which acts as a catalyst to our learning and leads to expertise in our navigation of the various landscapes in which we work and learn. (p. 579)

From a relational perspective, becoming information literate is about developing varying conceptions of information literacy as well as making experiences with information in a variety of ways, and knowing on which one to rely in a new situation (Bruce, 1997).

In Germany, Ballod (2007) describes information literacy as "the ability to deal with any kind of information in a self-determined, competent, responsible, and goal-oriented way" (p. 290). He adds various "principles": for individuals these are using information ethically and with discernment as well as economically, efficiently, and effectively; for organizations these are, in addition, the principles of taking into account social justice and equal opportunities when making use of information. He distinguishes between an emission perspective, which encompasses abilities and skills needed for presenting and communicating information, and a reception perspective, which includes the dimensions of searching and organizing as well as analyzing and evaluating (Ballod, 2005; Ballod, 2007, pp. 290–315). In the recently published German *Encyclopedia of Library and Information Science*, Homann (2011b-2013) refers to information literacy as "a comprehensive set of dispositions for action, which include more or less complex abilities and knowledge for solving information-related problems or ambiguities of action". Depending on the level of difficulty and type of problems he distinguishes between a "higher" and a "lower" information literacy (p. 432).

This section began with an outline of major definitions of information literacy; the underlying theoretical assumptions and foundations of these definitions, that is, behaviorism, constructivism, and variation theory, are explored in more detail in section 2.2.2.2. On the following pages, information literacy definitions as expressed in key models and standards are discussed. The section ends with an overview of concepts that compete with information literacy.

2.2.1.1 Information literacy models

The concept of information literacy as characterized by major models is the focus of this subsection. The emphasis is on the components of information literacy, not the underlying theoretical conceptions of information literacy learning and the implications for information literacy teaching; both will be discussed separately afterwards (in 2.2.2 and 2.2.3).

Following Wilson (2009), three types of models can be distinguished on a general level: human, physical, and conceptual; the latter are of interest here. He further explains: "All models, of whatever kind, are attempts at the representation, characterization, or exemplification of some aspect of reality or of human behavior. Models may be graphic, mathematical, or simply textual." (p. 2392). He also notes that, to varying degrees, they rely upon theory. Case (2012) emphasizes that although both models and theories are simplified representations of reality and descriptions of relationships between concepts, models usually precede formal theories from which they are different in the sense that they are more specific because they expose more particularities, more concrete because they tend to make use of visual displays such as diagrams, and more closely related to reality to which they can be adapted more easily (p. 134). As far as models of information literacy are concerned, Homann, who developed a German one for academic libraries, defines them as structured and simplified representations of the complex cognitive and emotional processes involved in individual information seeking and use (Homann, 2000b, p. 970) and considers them as playing a particular role on the conceptual level because they allow the delineation of information literacy from related concepts, such as media literacy or computer literacy (Homann, 2008, p. 96).

There are different types of models that cover aspects related to the broad concept of information literacy with various ways to categorize them. Among those described in the scientific literature, one type are *models of human information behavior*, which is "the study of the interactions between people, the various forms of data, information, knowledge, and wisdom that fall under the rubric of information, and the diverse contexts in which they interact" (Todd, 2003a, p. 27). Wilson (2009) emphasizes that information behavior models typically include the user of information and the environment in which he operates, as well as the information resources and 'tools' at his disposal. He distinguishes between "descriptive models" also called "models of activity", for which theory does not play an important role, "decision-based models", which are rooted in theory, and "causal models", which rely heavily

on theory and contain hypotheses about relationships. Models of the second type usually deal with the information process on an individual level and he cites Kuhlthau's ISP (Kuhlthau, 2004) as the "best known" example.

Another type cited in the scientific literature are *models of information seeking* or *models of information searching*. Case (2012) defines information seeking as "the conscious effort to acquire information in a response to a need or gap in ... knowledge" and as part of an individual's information behavior (p. 5). Several authors discuss the differences between information seeking and information searching in the context of LIS research. Wilson (2000) refers to information seeking as the broader concept and defines it as "purposive seeking for information as a consequence of a need to satisfy some goal", during which either manual or computer-based information systems can be used, and to information searching as "the 'micro-level' of behavior employed by the searcher in interacting with information systems of all kinds", which includes the individual's interactions with the computer on a technological level as well as his intellectual and mental activities (p. 49). Tanni and Sormunen (2008) explain that information seeking "is regarded as an overall human activity in acquiring information through various channels" whereas information searching "is associated with the use of a specified retrieval system" (p. 896). Xie (2009) uses information searching as a synonym for information seeking; as far as models are concerned, she distinguishes between those that are descriptions or illustrations of the information search process, for example, Kuhlthau's ISP (Kuhlthau, 2004), and those that explain the underlying factors of the process. Case (2012) mentions criteria for the distinction between models of information seeking such as emphasis on exposure to information as opposed to deliberate seeking, structure of the models, and the degree of testability. He discusses nine models, all with "a middle level of generality", among them Kuhlthau's ISP, which he qualifies as the "by far most cited" (p. 135).

Other ways of categorizing information literacy models are "general behavioral models" as opposed to "cognitive models" (Dinet & Tricot, 2008), "information science-oriented models" as opposed to "cognitive models" (Dinet, Chevalier, & Tricot, 2012), and distinguishing those that are process oriented from those that are not (Balceris, 2011; Ingold, 2005; Rauchmann, 2009). Talking about the empirical foundation of process models in Anglo-American countries, one of the authors of the Big6 model noted:

> Unfortunately, with the notable exception of Kuhlthau, ... process models for library and information skills were developed without any formal research. While most were

> developed after the authors had years of practical experience working with students and meeting their needs, the models are not empirically derived or tested in any formal field or laboratory study. (Eisenberg, 1992)

Another distinction, from the perspective of practice, is the distinction between models that are linear, cyclical, or spirals of interrelated steps (Williams & Wavell, 2006a, p. 47) or between "information search and use models", including not only the ISP and the Big6 but also, for example, pathfinders and strategies for web-quests, as opposed to "models for information inquiry, composition and scientific method" (Callison & Preddy, 2006, p. 36).

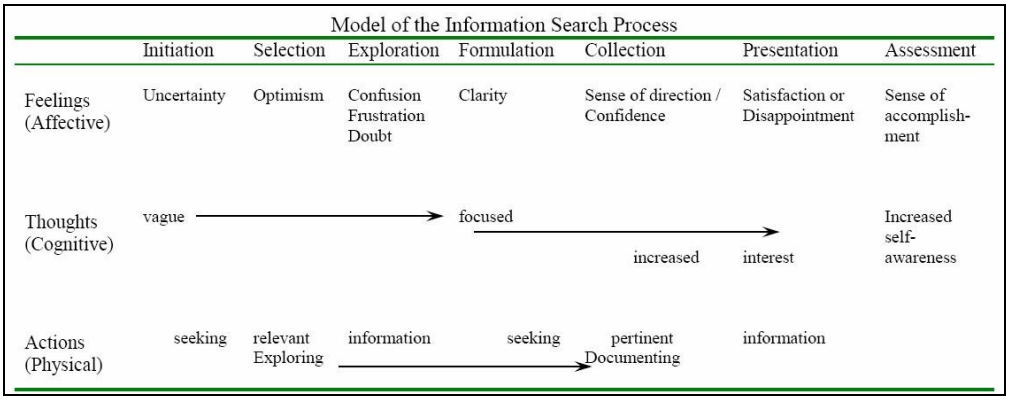
The first information literacy models relevant for education were developed in Anglo-American countries (Homann, 2000a, p. 198), especially in the USA and the UK, beginning in the 1980s (Loertscher, 2008, p. 42; Smith & Hepworth, 2007, p. 4). Anglo-American authors, including those from Australia, have remained leaders in the field and several of their models have been translated or used as a basis for the development of models in other countries, for example, Germany (Homann, 2000b, p. 970; Homann, 2003, p. 312). Of those developed in the context of education, the ones with the most solid research base and/or the most wide recognition and use on an international level together with the most important German ones are discussed here. Kuhlthau's ISP, especially for schools, and Eisenberg and Berkowitz' Big6, for various settings including schools, higher education, and the workplace, are both among those perceived as the most commonly used internationally (in the majority of the cited publications herein both models are discussed: Bernhard, 1998; Bruce, 2002; Dinet, Chevalier, & Tricot, 2012; Duplessis, 2004; Herring, 2011; Markless & Streatfield, 2009, pp. 317–318; Probert, 2009; *Les CRDP d'Aquitaine et de la Réunion avec les Académies d'Amiens et de Lyon et le CNDP*, n.d.; Slyfield, 2001); the two models are also among the most cited in Germany, in the scientific literature as well as in practice-related publications (Ballod, 2007; Bull, 2003; DIPF & DBV, n.d.; Freimanis, Orszullok, & Förster, 2013; Homann, 2000b; Homann, 2003; Homeyer, 2008; Ingold, 2005; Kürzl, 2004; Schulz, 2011; Tappenbeck, 2012). Herring's PLUS model is also included here because it was developed outside the USA, in the UK, and has also received international attention, especially in the school context (Bernhard, 1998; Herring, 2011, p. 68). In Germany, a comparatively low number of models have been developed; the two most important ones include Dannenberg's LIK, for all types of libraries, and Homann's DYMIK, for higher education (Balceris, 2011; Gapski & Tekster, 2009; Klingenberg, 2005; Rauchmann, 2009; Rauchmann, 2012). Those from Anglo-American countries that are among the most widely recognized in tertiary education on an international level, including Germany, are Bruce's Seven Faces, which is

also based on research, and SCONUL's Seven Pillars (Balceris, 2011; Chevillotte, 2009; Ingold, 2005; Rauchmann, 2009). These models are described on the next pages, beginning with the ISP and the Big6, for both of which the most detailed explanations are provided as they form the basis of several of the other models. Table 2-1 provides an overview.

The Information Search Process (ISP) by C.C. Kuhlthau

Kuhlthau developed, tested, and validated her model, called the *Information Search Process* (Figure 2-1), in numerous studies. The following five studies, all undertaken in the 1980s, were crucial: She began with a qualitative approach, that is, a case study combined with grounded theory, for investigating the experiences of 24 high-achieving high school students with the information process in two research paper assignments. In this study, based on theories of constructivist learning and theories of information seeking, she developed a model of the information search process that includes thoughts, actions, and feelings. Then, she tested the model in two longitudinal studies with the same students. The first study took place after four years of college (20 out of the 24 students participated) and the second study took place after four years of undergraduate study (with four out of the 24 students). Both studies showed that the model held over time and the second study also indicated that the information process is recursive rather than linear. Afterwards, Kuhlthau tested the model in two large-scale quantitative studies. The first study included 147 low-, middle-, and high-achieving students from six New Jersey high schools undertaking research papers and the second study a diverse sample (N=385) of users from school, academic, and public libraries. The model held in both studies so that it could be generalized to other students and to users across libraries (Kuhlthau, 1989; Kuhlthau, 2004). In the 1990s, Kuhlthau tested the model in two workplace studies; the first investigation was a longitudinal case study with a securities analyst and the second investigation was an exploratory study with eight lawyers. The model held but the studies showed that the ISP is only applicable in complex not routine tasks (Kuhlthau, 2004). A qualitative study, which Kuhlthau undertook together with two colleagues in ten New Jersey public schools with students in grades 6 to 12 (N=574) from 2003 to 2005, showed that the model also holds in digital environments (Kuhlthau, Heinström, & Todd, 2008).

Figure 2-1: Model of the Information Search Process



Note. Sources: Kuhlthau (2004, p. 82); Kuhlthau, Maniotes, and Caspari (2007, p. 19)

As mentioned above, Kuhlthau's model is based on constructivist learning theories, an aspect that will be discussed in 2.2.2 and 2.2.3. It describes the process individuals go through when searching for information in complex tasks, that is, about topics for which they possess a rather low level of prior knowledge, as opposed to routine searches about familiar topics (Kuhlthau, 2004, p. 197). She was one of the first to describe not only the physical and cognitive, but also the affective aspects, involved in a research process, which she found to be composed of the following seven phases:

> *Initiation:* In this phase the user recognizes an information need, takes actions to identify possible broad topics and typically experiences a feeling of uncertainty and sometimes even depression.
>
> *Selection:* The process of selecting a particular broad topic is accompanied by feelings of confusion and possibly anxiety followed by brief elation and the readiness to tackle the task after the decision has been made; typical actions are preliminary library searches and reading, or discussing possible topics with other people.
>
> *Exploration:* The user explores the broad topic through the location of relevant information, reading in order to expand the existing knowledge, and note taking; this third phase leads to the most significant portion of learning but is often experienced as particularly challenging because of inconsistencies and incompatibilities in the found literature and discrepancies between the found literature and prior knowledge; it involves feelings of confusion, doubt, threat, and increased uncertainty.

Formulation: After exploration, ideally, the user takes a decision and formulates a focus so that the topic becomes more personalized and thoughts become clearer; this fourth phase is experienced as the turning point where confidence increases when the user was able to build enough knowledge and to choose his focus.

Collection: This phase is that of collecting more information about the focused topic, which includes, for example, the location of pertinent information that supports but also extends the focus and detailed note taking; typical feelings are confidence and a higher level of interest.

Presentation: The user completes the search and presents the newly constructed knowledge, which may be followed by feelings of satisfaction or disappointment, depending on the reactions of the audience.

Assessment: In this last phase, the user assesses the whole process, which can lead to a higher level of accomplishment and self-awareness.

In summary, the user's feelings change from uncertainty at the beginning through optimism, confusion, clarity, confidence, satisfaction, or disappointment, to a sense of accomplishment; thoughts, vague or ambiguous at the outset, become more focused or specific as the user progresses; and as far as actions are concerned, the user first seeks relevant and then pertinent information. The whole process is recursive or sequential, not strictly linear (Kuhlthau, 2004; Kuhlthau, Maniotes, & Caspari, 2007; Kuhlthau, 2008).

For Kuhlthau, the ISP and information literacy are two different concepts; she describes the ISP as a process of knowledge building and learning from a variety of sources (Kuhlthau, 2004). Information literacy is a prerequisite for the process, also in the form of skills but, more importantly, in the form of transferable concepts that are "the foundation for developing high levels of proficiency and for adapting to new systems and sources that are emerging at a rapid pace" (Kuhlthau, Maniotes, & Caspari, 2007, p. 79). According to Kuhlthau and her co-authors, information literacy refers to the location, evaluation, and use of information. The concept of information location encompasses, for example, perceiving of a library as offering an organized collection and of the "inquiry as a journey and to find trails and pathways through information to develop search strategies that ... can [be applied] in many information quests"; the concept of information evaluation includes the notion of usefulness and criteria such as format, structure, and other characteristics of sources, for example, perspective and

currency; and the concept of information use refers to sense making and the construction of new, deep knowledge and includes decisions about importance, relevance, and pertinence of information, note taking, interpretation of information, organization, and presentation of ideas (Kuhlthau, Maniotes, & Caspari, 2007; Kuhlthau, 2010). Kuhlthau et al. also emphasize that students need to develop the following "four basic information literacy abilities", which are interwoven in all stages of the information process: recalling, summarizing, paraphrasing, and extending (Kuhlthau, 2004; Kuhlthau, Maniotes, & Caspari, 2007). Together with her two co-authors she developed "guided inquiry", a program for teaching with the ISP and enhancing information literacy, which will be referred to in section 2.2.3.

A shortcoming of Kuhlthau's important model may be that it expands, as its name indicates, on the process of searching information, which is described in five of the seven phases, whereas the whole process that comes afterwards, after the closure of the search to the evaluation or assessment, and which may also be experienced as difficult by students, is summarized in two phases. Another shortfall of this model, one shared by models in general, is the danger of an oversimplification, here in the sense that the huge number of concepts and skills necessary in order to complete the various phases, and especially the early ones, successfully cannot be taken into account.

The Big6 by M. B. Eisenberg and R.E. Berkowitz

In the late 1980s, Eisenberg and Berkowitz developed their model, the *Big6*, with the aim of offering "a simple, flexible, and broadly applicable approach to teaching and learning essential information literacy skills" (p. xiv). They describe it as a "curriculum", a "process", and "a set of skills" for addressing an information need (Eisenberg & Berkowitz, 2011, p. 116), and emphasize that the model is not only applicable in the school context, in all subjects and grades, but also in all types of personal situations or work settings (Eisenberg & Berkowitz, 2000, p. 9). They invite the user to integrate information technology into each step. For "very young children" they developed a simplified version called the "Super3", which includes the steps of planning, doing, and reviewing. The larger Big6 model encompasses the following six steps divided each into two "sub-skills" or "components", all of which the authors also refer to as the "Little12" (Eisenberg & Berkowitz, 2000):

1. *Task definition:* This step encompasses the components "define the problem", which includes the identification of "the parameters" of an assignment and the selection, narrowing, or broadening of a topic, and "identify the information needed", which

encompasses, for example, the identification of key words and the recognition of the required type and quantity of information and sources.

2. *Information Seeking Strategies*: The second step includes, as a first component, "determine all possible sources", which requires knowledge of sources as well as the ability to ask an intermediary, such as a librarian, for help, and the consideration of "neglected sources", such as community experts or documentary films. The second component, "select the best sources", invites the user to select sources that can be expected to offer information of a high quality.

3. *Location and Access:* The sub-skills expected of the user here are the ability to find the sources, for example, in the library or on the web, and to locate the information within the sources, which includes the use of indexes or table of contents.

4. *Use of Information:* In this step, the users "engage" with the information, for example, through reading, hearing, or viewing, and "extract relevant information", which requires the ability to identify key words, take notes, make summaries, and do citations of sources.

5. *Synthesis*: The two components here are "organize information from multiple sources", which can range from "simple" to "very complex", depending on the type of task, and "present the result", which includes the choice of a format and the completion of the choice.

6. *Evaluation:* The last step first includes the user's own judgment of the result based on "effectiveness" and it encompasses monitoring progresses throughout the process as well as determining, at the end, if a task has been successfully completed; the authors refer to it as the user's "summative evaluation". The second component is the user's judgment about the quality of the process, that is, about his "efficiency" in terms of time and effort; it should take place at every stage and take into account the whole range of actions taken to address the sub-skills.

Although they also perceive of their model as a process, Eisenberg and Berkowitz (2000) emphasize that it is not a strictly linear or ordered procedure. However, they recommend to begin with task definition (p. 15), about which they report "from experience", albeit not from their own formal empirical research, that students encounter the most difficulties (p. 10). The authors also claim that people use the steps "consciously or not", and "that in almost all

successful problem-solving situations, all stages are completed" (p. 5). The two authors originally developed and have later refined their model, which is extremely widespread in K-12 education, in the first place based on practical experience (Eisenberg, 1992, pp. 4–5) and "strong anecdotal record" (Wolf, Brush, & Saye, 2003).

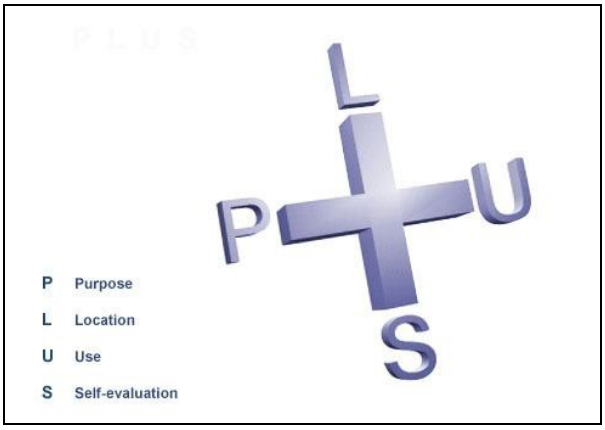
The missing research base, especially at the outset, is a major difference from the model developed by Kuhlthau, who sought to understand and describe what users experience when they undertake research, whereas Eisenberg and Berkowitz wanted to identify and describe the steps a user should ideally undertake in order to complete a research task successfully. And while Kuhlthau found that users experience the process as described in her model only in complex tasks, Eisenberg and Berkowitz wanted the Big6 to be of use for all types of tasks, from the most simple to the most complex (Eisenberg & Berkowitz, 2000, p. 25): they wanted it to be "a broadbased, logical skill set that can be used as the structure for developing a curriculum or the framework for a set of distinct problem-solving skills" (Eisenberg, 2008, p. 41). One of the major contributions of Kuhlthau was the adoption of a holistic perspective that takes into account the affective dimension and the recognition of uncertainty and confusion as being natural elements of complex research tasks; though not explicitly part of the Big6 model, its authors take the affective level into account by suggesting the use of tools such as the "Individualized Information Problem-Solving Profile" that helps students to become aware and keep track of their emotions when dealing with an information problem (Eisenberg & Berkowitz, 2000, p. 173).

The authors wanted to create a model that is easily applicable (Eisenberg & Berkowitz, 2000, p. 9); on the one side, it has been criticized for being too mechanistic (Johnston & Webber, 2003, p. 337), while on the other side, this contributed to its success, for example, in US schools and higher education, and is one of the reasons why it was perceived as particularly well suited as a basis for other models (Homann, 2000b, p. 970). The next three models, Herring's PLUS model, Dannenberg's LIK model, and Homann's DYMIK model, are based on the Big6, both the Big6 and the ISP, often together with other models or theories, and are only described briefly.

The PLUS model by J.E. Herring

In Scotland, in the late 1990s, Herring published his *PLUS model*, which is displayed in Figure 2-2.

Figure 2-2: The PLUS Model



Note. Source: Learning and Teaching Scotland (n.d.)

He relied heavily on existing theories from education and information literacy models that had been developed previously, including the Big6 (Herring, 1996; Herring, 1999), from all of which he integrated and combined crucial elements that he grouped under the following four, not strictly linear, interrelated steps (Herring, Tarter, & Naylor, 2002), which require both mechanical and cognitive skills, the latter being the most important (Herring, 1996):

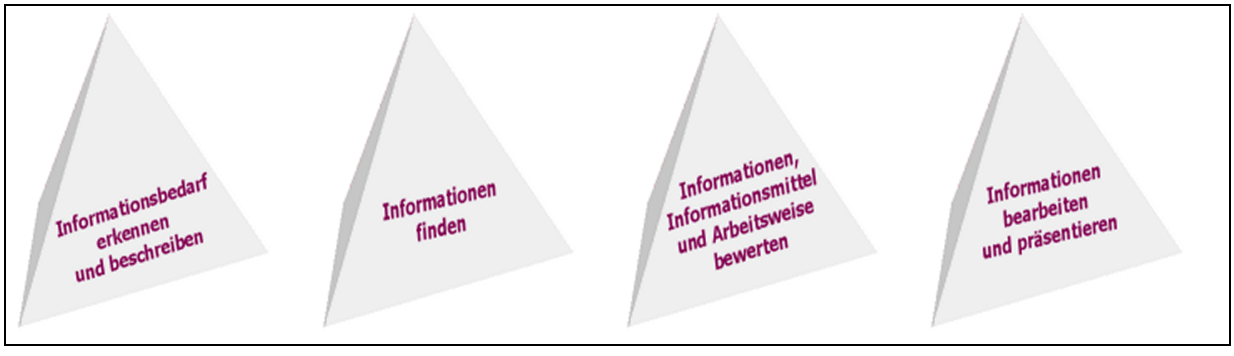
> *Purpose*: The identification of the purpose of a research task encompasses, for example, the identification of prior knowledge, the development of questions or key words, reflections about potential sources, brainstorming, or a combination of those.
>
> *Location*: In this step the user finds resources that are relevant to the purpose; it includes the ability to use libraries, the internet, and human sources.
>
> *Use*: Is "the centre piece of the process" (p. 108) and involves, for example, engagement with resources through reading, viewing, listening in order to identify relevant information; the ability to understand information and to combine it with prior knowledge; the purposeful selection of information; evaluation of information in terms of currency, authorship, and bias; note taking; synthesizing; communicating or presenting in written or oral format.
>
> *Self-Evaluation:* The fourth step requires students to reflect on their products and performance, and to consider their own learning as well as areas for improvement. It should not only take place at the end but also constantly during the process.

Discussing information literacy for the school context in more recent publications, Herring (2010) states that it is more than "a set of skills or ... a process" (p. 299) and defines it "as a critical and reflective ability to exploit the current information environment, and to adapt to new information environments; and as a practice" (p. 32). He emphasizes that his definition unlike others includes the notion of transfer of information skills from one learning environment to another, for example, across subjects and grade levels or from school to higher education or the workplace (p. 30). The use of the PLUS model has been investigated empirically in the context of secondary education (Herring, Tarter, & Naylor, 2002; Herring, 2006).

The LIK Information Literacy Model by D. Dannenberg

Also based on US models, in Germany, "in a private initiative" Dannenberg has developed and refined an encompassing program called *Lernsystem Informationskompetenz* (LIK) (Information Literacy Learning System) since 1999 for use in all types of libraries with the aim of fostering lifelong learning of all German citizens (Dannenberg, 2002; Dannenberg, 2000). He considers information literacy as being closely related to reading and media literacy (Dannenberg, 2005) and his program includes an information literacy model (Figure 2-3) that is presented in the form of a tetrahedron, the four triangular faces of which contain the following aspects: recognizing and describing the information need; finding information; evaluating information, information sources, and actions; and processing and presenting information (Dannenberg, 2000; Dannenberg, 2012a).

Figure 2-3: The LIK Information Literacy Model



Note. Source: Dannenberg (2012a)

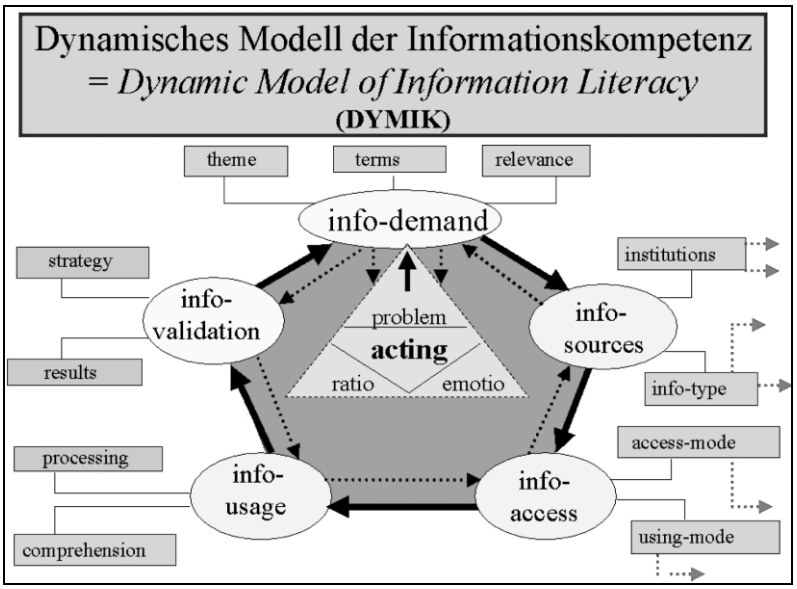
With the form of the tetrahedron the author wants to emphasize that the development of information literacy competencies does not occur in steps or as a linear sequence and that,

instead, the four sides or aspects are interrelated and interdependent (Dannenberg, 2000; Dannenberg, 2005).

Dynamic Model of Information Literacy by B. Homann

Again in Germany, in 2000, in the context of higher education this time, Homann developed a model called *Dynamisches Modell der Informationskompetenz* (DYMIK) (Dynamic Model of Information Literacy) based on US models, especially the Big6 and the ISP, with the aim of moving from a system- to a user-centered or from an object- to a problem-oriented approach in library education (Homann, 2000a; Homann, 2003). The model (Figure 2-4) consists of five recursive phases, "info-demand", "info-sources", "info-access", "info-usage", and "info-validation", organized in a circle for emphasizing the dynamic nature of the process in the sense that information processes usually lead to the initiation of a new information process rather than an immediate answer.

Figure 2-4: Dynamic Model of Information Literacy



Note. Source: Homann (2003, p. 313)

The extensive visual representation of the model includes information systems and the skills needed for their use and sets them in a "functional relationship" with the five phases (Homann, 2000a, p. 203); the focus of the model is "human action with its emotional and rational components" (Homann, 2003, p. 314). It neither includes the presentation of information nor the combination of new information with existing knowledge (Rauchmann, 2009, p. 78). Homann designed his DYMIK model basically as "an instrument for the didactic and methodical improval [*sic*] of the modular training sessions and the addition of internet-

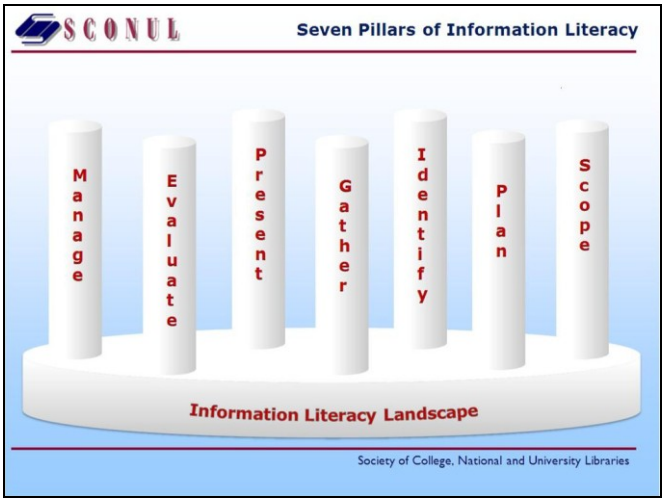
based tutorials concerning information literacy" in academic libraries (Homann, 2000a, p. 195); it has no research base.

More information literacy models have been developed for primary and secondary schools than for tertiary education (Herring, 2010, p. 70). In addition to the previous model from Germany, a higher education one from the UK and one from Australia are discussed here.

The SCONUL Seven Pillars of Information Literacy

Also displayed in a circle (Figure 2-5), and more precisely in "a three dimensional circular 'building' founded on an information landscape which comprises the information world as it is perceived by an individual at that point in time" (SCONUL Working Group on Information Literacy, 2011, p. 4), is the new version of *The Seven Pillars of Information Literacy*. The Seven Pillars were first presented by the Working Group on Information Literacy of the Society of College, National and University Libraries (SCONUL) in the UK and Ireland in 1999 and revised and expanded in 2004 and again in 2011. The most recent version states that "information literate people will demonstrate *an awareness of how they gather, use, manage, synthesise and create information and data in an ethical manner and will have the information skills to do so effectively*" (emphasis in original) (SCONUL Working Group on Information Literacy, 2011, p. 3).

Figure 2-5: The Seven Pillars of Information Literacy



Note. Source: SCONUL Working Group on Information Literacy (2011, p. 4)

The model displays what people need to develop as an information literate person; the circular form emphasizes the non-linearity of the development as well as the fact that for each individual within the seven pillars, developments can happen simultaneously and independently. The pillars, which are described on two levels, one labeled "ability", and

including “skills and competencies”, the other one labeled “understanding”, and comprising “attitudes and behaviors” (SCONUL Working Group on Information Literacy, 2011), are the following:

Identify: Is described overall as the ability to identify an information need. It includes, for example, on the conceptual level an understanding “that ideas and opportunities are created by investigating/seeking information”, and on the skills level such different competencies as the identification of a knowledge gap in a particular subject and time management related to the search task.

Scope: According to this pillar, an information literate person “can assess current knowledge and identify gaps”. It encompasses, for example, an understanding of types and formats of information and the interrelationship of both, or the ability to identify the best-suited types of information to address the information need.

Plan: Is the competency to “construct strategies for locating information and data”. It requires, for example, an understanding of searching techniques and the ability to “select the most appropriate search tools”.

Gather: People who are competent in this area “can locate and access the information and data they need”. They understand the organization of data or “the risks involved in operating in a virtual world” and on the skills level they are able to use a variety of retrieval tools and resources or to find out that their information need has not been met.

Evaluate: Is overall referred to as the ability to “review the research process and compare and evaluate information and data”. A competent evaluator, for example, understands criteria for evaluation of information and sources, such as accuracy, reputation or relevance, and has the ability to apply them.

Manage: This pillar is about the ability to “organise information professionally and ethically”. It includes, for example, an understanding of the notions of honesty with regard to information use as well as communication, systematic records or ethical storage, and the ability to cite sources correctly.

Present: A competent information presenter “can apply the knowledge gained: presenting the results of their research, synthesising new and old information and data

> to create new knowledge and disseminating it in a variety of ways". For example, he understands "the difference between summarising and synthesising" and has the competency to do both of them orally and in written format.

Within each of the seven pillars, an individual can progress from novice to expert or, if he does not keep up with the requirements of a constantly changing information environment, also regress. The authors present different versions: a core model complemented by "lenses", such as a "research lens" and a "digital literacy lens", which are expanded or simplified models for specific groups of learners (SCONUL Working Group on Information Literacy, 2011: 3). Another particularity of the model is the distinction between the identification of an information need and a knowledge gap in two separate pillars ("identify" and "scope"). However, the early stages, outlined as crucial by Kuhlthau based on research, and in particular the formulation of a focus, are neglected. The combination of new information with prior building is integrated but in the form of skills rather than as the process described in the ISP from which the Seven Pillars are also different in the sense that they distinguish between a conceptual and a behavioral skills level, but do not include the affective dimension or take into account the uncertainty principle. Similar to the model that is described next, Bruce's seven conceptions, they encompass aspects related to the control of information, though not as explicitly.

The Seven Faces of Information Literacy by C. Bruce

Based on her own phenomenographic research with tertiary faculty, Bruce developed an information literacy model in Australia in 1997 called *The Seven Faces of Information Literacy*. She uses "faces" as a synonym for "conceptions" and explains:

> Conceptions of information literacy may be defined as qualitatively different relations between individuals and some aspect of their information environment which could not be predetermined. Varying conceptions are also often described as different ways of seeing, experiencing or understanding a phenomenon. The set of conceptions taken together, represent the phenomenon being studied. (Bruce, 1997, p. 14)

Bruce (1997) considers her relational model as an alternative to the skill-driven behavioral models, which were predominant in the late 1990s (p. 1). Based on her model, she defines information literacy as "using information technology for information retrieval and communication", "finding information", "executing a process", "controlling information", "building up a personal knowledge base in a new area of interest", "working with knowledge and personal perspectives adopted in such a way that novel insights are gained", and "using

information wisely for the benefit of others" (p. 154). In her study, Bruce found that the conceptions were structurally related and she identified a hierarchy: conceptions grow in sophistication from the information technology conception at the bottom to the wisdom conception at the top (pp. 111-112). Bruce also emphasized that information literacy was probably experienced at different times by one member of the community in these various ways rather than being experienced in one way by one member and in another way by a second member (p. 154) (see section 2.3.1 for further details about the study and conceptions). Moore (2006) noted that one person in a single research task may experience the seven conceptions at different times. Other researchers around the world have tested Bruce's model with different groups of participants or compared their own findings to her model and found important similarities but also differences (Boon, Johnston, & Webber, 2007; Catts, 2005; Latham & Gross, 2008; Maybee, 2006). A shortcoming of the model is the neglect of the affective dimension in the individuals' relationships with their information environment.

Table 2-1 provides an overview of the aforementioned information literacy models and their characteristics. A major distinction between the models is that some are based on empirical research, especially on studies undertaken by the authors of the models, while others are not. Among the group of the empirically-based, Kuhlthau's ISP, which defines information searches in the context of complex tasks as processes of seeking meaning from a variety of sources, is the most widespread in secondary education, and Bruce's model of the Seven Faces, which describes information literacy in terms of the relation between people and their information environment, has the most recognition in tertiary education. However, the majority of models belong to the (non-empirical) second group, out of which the ones that have received the most attention on an international level are Eisenberg and Berkowitz' Big6, which is not exclusively but most-widely used in schools, and SCONUL's Seven Pillars for higher education. The models in this group tend to neglect or minimize the important and difficult early phases during which, as outlined in Kuhlthau's ISP, the user is involved in intense reflection in order to gain his own personal perspective and to build new knowledge, and the affective dimension, concentrating instead on behavioral and cognitive aspects. Regardless, all of the models, whether they are research-based representations of reality or descriptions of ideal paths, share the difficulty of coping with the complexity inherent in individuals' involvement with the information environment. Looking at those skills and conceptions that can be found in all of the models, it should be noted that there is no

unanimity among authors about how exactly they should be categorized or grouped: those that may be part of one category in one model may be part of another one in a second model.

Table 2-1: Comparison of IL Models

	Kuhlthau ISP	**Eisenberg & Berkowitz Big6**	**Herring PLUS model**	**Dannenberg LIK model**	**Homann DYMIK**	**SCONUL 7 Pillars**	**Bruce 7 Faces**
Country	USA	USA	UK	Germany	Germany	UK	Australia
Basis of the model	Author's own research	Authors' experiences	Other models, including Big6 and ISP	US models, especially Big6	US models, especially Big6 and ISP	Experiences, other models	Author's own research
(IL) Com-ponents	7 phases: (recursive; sequential) Initiation, Selection, Exploration, Formulation, Collection, Presentation, Assessment	6 steps: (not strictly linear) Task definition, Info seeking, Location and access, Use of info, Synthesis, Evaluation	4 steps: (not strictly linear) Identification of Purpose, Location, Use, Self-evaluation	4 sides: (interrelated and inter-dependent) Recognizing and describing info need, Finding, Evaluating, Processing and presenting	5 steps: (recursive; circular) Info-demand, Info-sources, Info-access, Info-usage, Info-validation	7 pillars: (circular; linked; maybe simultaneous) Identify, Scope, Plan, Gather, Evaluate, Manage, Present	7 conceptions (interrelated; hierarchical) Use of IT, Finding info, Executing process, Controlling info, Building knowledge, Extending knowledge Wise use of info
Under-lying concept of IL learning	ISP as a process of knowledge construction; IL (as pre-requisite for ISP) refers to development of abilities and especially transferable concepts	Development of behavioral and cognitive skills	Development of behavioral and cognitive skills	Development of behavioral and cognitive skills	Development of behavioral and cognitive skills	Development of behavioral and cognitive skills, awareness, attitudes	IL as developing new conceptions and making varying experiences with info (environment)
Field of appli-cation	Secondary education	Inside and outside formal education	Secondary education	All types of libraries	Academic libraries	Tertiary education	Tertiary education
Type of tasks	Complex tasks	All types of info tasks (school, personal, work)	School-related tasks	Especially library-related tasks	Especially library-related tasks	Especially library-related tasks	All types of info tasks in tertiary education
Strengths	Represen-tation of reality; holistic (includes physical, cognitive, and affective dimension)	Easily and broadly applicable; simplified version for younger users	Short; emphasis on transfer	Non-linear represen-tation; model is part of a whole program	Non-linear represen-tation; affective dimension included	Different versions; role of prior experiences emphasized; info control included	Represen-tation of reality; alternative to behavioral and cognitive approaches
Weak-nesses	Neglect of later phases (from closure of search to assessment)	Description of ideal paths; neglect of early phases; affective dimension taken into account as "add-on"	Description of ideal paths; neglect of early phases and affective dimension	Description of ideal components; neglect of focus formulation and affective dimension	Description of ideal com-ponents; neglect of focus formulation and knowledge building; no reference to presen-tation of info	Description of ideal com-ponents; neglect of focus formulation and affective dimension; knowledge construction included but in terms of skills rather than process	Neglect of affective dimension

2.2.1.2 Information literacy standards

The concept of information literacy as characterized by major standards is the focus of this subsection; the use of standards for information literacy teaching will be discussed separately in section 2.2.3.

In general terms and "in its modern senses", the term *standard* refers to both "a source of authority and a level of achievement" (Timmermans & Epstein, 2010, p. 70), or a goal and a measure (Ravitch, 1995, p. 7). Timmermanns and Epstein (2010) further explain:

> Standards ... tend to span more than one community of practice or activity site; they make things work together over distance or heterogeneous metrics; and they are usually backed up by external bodies of some sort, such as professional organizations, manufacturers' associations, or the state. (p. 70)

Discussing standards for public libraries, Umlauf (2005c) found that their number is surprisingly limited (p. 19). In education, they define the minimum competencies which students should have developed at a particular point in their school career so that three types of interrelated standards are distinguished (Ravitch, 1995, p. 13):

> *Content standards:* Precise and detailed descriptions of the skills and knowledge teachers are expected to teach and students are expected to learn; they should be formulated in such a way that they are measurable.
>
> *Performance standards:* Definitions "of degree of mastery or levels of attainment" of content standards; they typically include the required type of evidence as well as statements about performance levels.
>
> *Opportunity-to-learn, or school delivery, standards:* Specifications of contextual conditions, for example, staffing, resources, programs, that need to be provided by schools, districts, and states so that students can meet content and performance standards.

Educational standards are typically formulated for subject areas and across grade levels; information literacy standards are either included in subject-related standards or presented in separate documents (Eisenberg & Berkowitz, 2011, p. 124). In Germany, the DGI (2008), that is, the German Society for Information Science and Information Practice, stipulates a permanent integration of information literacy into educational standards. Tappenbeck (2012)

emphasizes that information literacy standards need to be updated on a regular basis and take into account the requirements of a constantly changing information environment and the needs of users, as individuals or as a group. She considers the development of different versions of standards for the various groups of users as a first step in that direction (p. 163). Referring to the USA, Eisenberg and Berkowitz (2011) note that standards of information literacy or of information, communications, and technology are developed predominantly by subdivisions of ALA, such as the Association for College and Research Libraries (ACRL), the American Association of School Librarians (AASL), and by the International Society for Technology in Education (ISTE), but also by state authorities (Eisenberg & Berkowitz, 2011, p. 125). Talking about Anglo-American countries in general, Duke and Ward (2009) state that "in the last decade ... many agencies, organizations, and institutions that govern, accredit, and support primary, secondary, and postsecondary education in the United States, Canada, Australia, and New Zealand have adopted information literacy standards for students and teachers" (p. 254).

Crucial information literacy standards, called *Information Literacy Standards for Student Learning*, were developed in the USA in 1998 by AASL together with the Association for Educational Communications and Technology (AECT) as part of the national guidelines for school library programs *Information Power: Building Partnerships for Learning.* These standards have been recognized on an international level, including in Germany (Ballod, 2007; Balceris, 2011; Bruce, 2002; Freimanis, Orszullok, & Förster, 2013; Homann, 2008; Klingenberg, 2005; Rauchmann, 2009; Umlauf, 2005b) and were revised and replaced in 2007 by the AASL *Standards for the 21st-Century Learner*, which have also received international attention (*Les CRDP d'Aquitaine et de la Réunion avec les Académies d'Amiens et de Lyon et le CNDP,* n.d.; Loertscher, 2008; Schulz, 2011). For tertiary education, the internationally "best known", including in Germany, are the *Information Literacy Competency Standards for Higher Education* published by ACRL in 2000 (Chevillotte, 2009, p. 2422; Umlauf, 2005b, p. 10); they will be revised in 2013-14 (Bell, 2013). Also frequently mentioned on an international level are those developed by the Council of Australian University Librarians (CAUL) in 2001 and their revised version edited by the Australian and New Zealand Institute for Information Literacy (ANZIIL) in 2004. Authors who give an overview of information literacy standards for tertiary education either mention the ACRL standards (Bruce, 2002; *Les CRDP d'Aquitaine et de la Réunion avec les Académies d'Amiens et de Lyon et le CNDP*, n.d.; Klingenberg, 2005; Rauchmann, 2012; Umlauf, 2003) or all three standards (Balceris, 2011; Chevillotte, 2009; Freimanis, Orszullok, & Förster, 2013;

Herring, 2010; Homann, 2008; Ingold, 2005; Rauchmann, 2009). All these standards for schools and higher education will be briefly discussed in the present review together with the major German standards.

Vom Orde (2012) notes that in Germany the first information literacy standards appeared in 2002, with Homann's translation of the ACRL standards (Homann, 2002). Thereafter, at first standards were predominantly developed for higher education and especially at the state-level by so-called information literacy "working groups" or "networks" typically composed of academic and state librarians (Vom Orde & Wein, 2012, p. 483). One of the first, the most cited ones, and the ones having served frequently as a basis for other standards, are those presented in Baden-Württemberg in 2006 (Balceris, 2011; Freimanis, Orszullok, & Förster, 2013; Homann, 2008; Rauchmann, 2012); in 2009 they served as a basis for the development of national standards (Rauchmann, 2012; Dienstleistungskommission des DBV, 2009) and will be discussed here. Information literacy standards for schools were developed later, among the first were those from Bavaria, published in 2011 (Vom Orde & Wein, 2012, p. 484). They will be briefly reviewed here together with the "framework of reference" developed by Klingenberg in the same year.

Information Literacy Standards for Student Learning, by AASL and AECT, and the Standards for the 21st-Century Learner, by AASL

The *Information Literacy Standards for Student Learning*, published by AASL together with AECT in 1998, are the result of the revision of the information standards published in 1988 as part of *Information Power: Guidelines for School Library Media Programs*, by AASL and AECT. Before the 1998 version was released, the final draft was validated in a national Delphi study that was undertaken by Doyle in 1996-97 (Eisenberg, Lowe, & Spitzer, 2004, p. 20). The standards describe the "content and processes in relation to information" that a student needs to be able to handle in order to be considered as information literate (American Association of School Librarians and Association for Educational Communications and Technology, 1998b). They contain the three categories of "information literacy", "independent learning", and "social responsibility", for which altogether nine standards and 29 indicators are formulated; for indicators, three proficiency levels are described: "basic", "proficient", and "exemplary". The nine standards are the following:

For information literacy
Standard 1: The student who is information literate accesses information efficiently and effectively.
Standard 2: The student who is information literate evaluates information critically and competently.
Standard 3: The student who is information literate uses information accurately and creatively.

For independent learning:
Standard 4: The student who is an independent learner is information literate and pursues information related to personal interests.
Standard 5: The student who is an independent learner is information literate and appreciates literature and other creative expressions of information.
Standard 6: The student who is an independent learner is information literate and strives for excellence in information seeking and knowledge generation.

For social responsibility:
Standard 7: The student who contributes positively to the learning community and to society is information literate and recognizes the importance of information to a democratic society.
Standard 8: The student who contributes positively to the learning community and to society is information literate and practices ethical behavior in regard to information and information technology.
Standard 9: The student who contributes positively to the learning community and to society is information literate and participates effectively in groups to pursue and generate information.

Although the standards include aspects related to constructivist learning theory, they have been applied predominantly as skills. Similarly, information location, which includes aspects such as recognition of an information need, the formulation of questions, or the identification of potential sources, and information evaluation, which encompasses an understanding and application of information assessment in terms of accuracy, relevance, comprehensiveness, or fact vs. opinion, have been overemphasized at the expense of information use, which includes the organization of information, its integration into prior knowledge, its application in critical thinking or problem-solving, and its communication (Gordon, 2009).

The revised version, published by AASL in 2007 under the title of *Standards for the 21st-Century Learner* (American Association of School Librarians, 2007), sought to compensate these and other deficiencies when it stated:

Learners use skills, resources and tools to:

1. Inquire, think critically, and gain knowledge.
2. Draw conclusions, make informed decisions, apply knowledge to new situations, and create new knowledge.

3. Share knowledge and participate ethically and productively as members of our democratic society.
4. Pursue personal and aesthetic growth.

The new standards introduce the notion of "inquiry" and clearly emphasize the use of information for knowledge construction and personal growth. Although a comparison of the "skills" in the new version with the "indicators" in the old version shows that only four of the skills do not have an equivalent (SLMAM skills correlations, n.d.), a major contribution of the 2007 document was that for each of the four standards not only "skills", but, in addition, "dispositions in action", that is, "ongoing beliefs and attitudes that guide thinking and intellectual behavior that can be measured through actions taken", as well as "responsibilities" and "self-assessment strategies" are described. As far as the concept of information literacy is concerned, the new document sees it as one of a multiplicity of important literacies, "including digital, visual, textual, and technological", it considers the development of "the skills to select, evaluate, and use information appropriately and effectively" as a necessity for each individual, and the document describes information literacy as a crucial learning skill (American Association of School Librarians, 2007).

Information Literacy Competency Standards for Higher Education, by ACRL

The ACRL standards for higher education are an expanded version of the AASL standards for schools that were developed two years earlier, in 1998, and helped to ensure continuity (Association of College and Research Libraries, 2000, p. 5). The document describes information literacy as "a set of abilities" (p.1) and contains five standards, 22 performance indicators and for each indicator several "outcomes", 87 altogether, that can be used for assessing student progress. The standards are the following:

Standard one: The information literate student determines the nature and extent of the information needed.

Standard two: The information literate student accesses needed information effectively and efficiently.

Standard three: The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.

Standard four: The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.

> Standard five: The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.

Owusu-Ansah observed in 2005 that the ACRL standards are based not only on the 1989 ALA definition but also the work of Doyle, Eisenberg and Berkowitz, Bruce, Kuhlthau, and others and concluded that they "could be rightfully considered the most elaborate and all-inclusive attempt ... in the endeavors to determine what constitutes, in a measurable way, information literacy" (p. 369). However, there are differences between information literacy as understood by these authors and the ACRL document. Although it refers explicitly to the 1989 ALA definition, which begins with the recognition of an information need, the standards take into account this aspect to a lesser extent, mentioning solely the identification of the "nature and extent" of the need in the first standard but the recognition or awareness of the need as such only among the outcomes of the first indicator for the first standard and as a second option after the identification of a research topic. Similarly, the formulation of a focus, identified by Kuhlthau as a pivotal and extremely difficult point in any information process about complex tasks, tends to be underestimated and also reduced to one of the outcomes. Numerous other standard documents are based on the ACRL standards, for example the following developed in Australia and New Zealand.

CAUL and ANZIIL Information Literacy Standards

In 2001, the Council of Australian University Librarians (CAUL) published an adapted version of the ACRL standards (Council of Australian University Librarians, 2001). Major differences in the CAUL standards are the reference to users on a more general level, that is, the use of the term "person" as opposed to "student"; the explicit mentioning of the recognition of an information need in the first standard; the reformulation of the fourth standard with an emphasis not only on the manipulation but also the classification and storage of the gathered and produced information; and the integration of two new standards:

> The information literate person expands, reframes or creates new knowledge by integrating prior knowledge and new understandings individually or as a member of a group.
>
> The information literate person recognises that lifelong learning and participative citizenship requires information literacy.

The standards were revised three years later by the Australian and New Zealand Institute for Information Literacy (ANZIIL) (Bundy, 2004). Differences to the previous version included,

the deletion of the second new standard; changes in terminology, such as "finding" information instead of "accessing" information; in the third standard, the mentioning not only of evaluating information but also the process of information seeking; and in the sixth standard the addition of the application of "cultural, ethical, economic, legal, and social issues surrounding the use of information" not only their understanding (Homann, 2008, pp. 93–94). The ANZIIL standards and the learning outcomes related to them "consist of the characteristics, attributes, processes, knowledge, skills, attitudes, beliefs and aspirations associated with the information literate person" (Bundy, 2004, p. 7). According to them, information literacy combines "generic skills", which include problem solving, collaboration and team work, communication and critical thinking; "information skills", which refer to the seeking and use of information as well as to fluency with information technology; and "values and beliefs", which encompass wise and ethical use of information, social responsibility and community participation. These three dimensions of information literacy learning are affected by the disciplinary context.

Information Literacy Standards for Students, by NIK-BW

In Germany, the Information Literacy Network in the state of Baden-Württemberg (NIK-BW) published standards for higher education in 2006 (*Netzwerk Informationskompetenz Baden-Württemberg*, 2006). The authors emphasize that although their standards are based on Anglo-American examples, they adopt a narrower view of information literacy, one that is more in concordance with the "specific tasks and competencies of German libraries" (*Netzwerk Informationskompetenz Baden-Württemberg*, 2006, p. 2). Their five standards encompass (1) the recognition and formulation of an information need as well as the identification of the needed information; (2) efficient access to the needed information; (3) evaluation and selection of the located information and sources; (4) efficient use and communication of the new information; and (5) responsible information use and communication. The notion of information literacy as a way of learning or a process of building new knowledge, and on a more general level, as a prerequisite for personal growth and participation in a democratic society as outlined in Anglo-American standards are not part of these German standards.

Information Literacy Standards for Schools, by AGIK BAY

The standards developed for secondary school students by librarians and teachers on the initiative of the Bavarian Information Literacy Working Group (AGIK BAY), which is composed of librarians from academic and state libraries, takes a similar library-focused

perspective. Their aim is to "enhance students' sensibility regarding information use and their interest in information searches that are based on scientific principles" (*AG Informationskompetenz im Bibliotheksverbund Bayern*, 2011). The five standards define competencies and skills related to (1) the familiarity with local libraries; (2) research strategies; (3) efficient acquisition of the found literature; (4) location and use of electronic sources; and (5) efficient manipulation of the gathered information.

Framework of Reference for Information literacy, by A. Klingenberg for DBV

A different approach was used by Klingenberg in 2011 who developed, on the initiative of and together with the commission *Library and School* of the German Library Association (DBV), an information literacy framework in the style of the Common European Framework of Reference for Languages. The information literacy framework of reference distinguishes between four sub-competencies, "searching", "verifying", "knowing", and "displaying", for each of which either four consecutive steps or four criteria are formulated. For students' ability to apply the steps or criteria, six proficiency levels are identified, each time two for "basic", "independent", and "sustained" information literacy (Klingenberg, 2011; Klingenberg, 2012). Unlike in the previously mentioned German standards, knowledge construction is integrated into this framework, in the form of "formulating" new knowledge in own words, "comparing" old and new information, "integrating" in a broader context, and "structuring", that is, combining various pieces of information (Klingenberg, 2012).

In summary, as far as the concept of information literacy displayed in them is concerned, all of the above standards encompass the elements of the ALA 1989 definition, recognition of an information need, as well as location, evaluation, and use of information, although to varying degrees and supplemented by a more or less important number of additional competencies. Moreover, knowledge construction tends to play a more important role in newer versions.

Standards have either been criticized for displaying a too narrow or a too encompassing definition of information literacy. Belonging to the first group, Vom Orde (2012) asserted that German standards focus too much on library contents, terminology, and operationalizations (p. 485). Hapke (2007), talking about standards regardless of their country of origin, argued that, from a holistic perspective, they are unable to take into account the multiple dimensions inherent in the concept of information literacy (p. 140); he also emphasized that there can neither be one single definition of information literacy nor a set of clearly identifiable standards applicable to anybody (Hapke, 2012, p. 41). Being part of the second group,

Herring (2010) found that standards provide too comprehensive definitions of information literacy, when both standards and indicators are taken into account (p. 28), and Tappenbeck (2012) noted that standards risk being "unrealistic" in the sense that users are not able to develop all of the required competencies (p. 159).

The next subsection discusses other important definitions of information literacy than those expressed through models and standards with a focus on concepts that compete with information literacy.

2.2.1.3 Information literacy and competing literacies

Information literacy is one among a multiplicity of literacies considered as important in the information age. After having briefly explored the notion of literacy, this subsection first gives an overview (Table 2-2) of concepts that are related to or overlap with that of information literacy with a particular focus on media literacy because it plays an important role in Germany. Then it discusses information literacy being considered itself as an umbrella concept and finally being perceived as a component of another broader concept.

The concept of literacy

Literacy has been described in a multitude of ways and its meaning has changed over time (Bawden, 2001; Garbe, 2010). On a general level, it is defined as the ability to read and write, considered as a "human *technology*" (emphasis in original) and as being closely related to formal education, both in the sense that it does not develop naturally and given the predominance of text and the crucial role of written language, also in the sense that it is a prerequisite for learning. Literacy can include numeracy skills and others; in the last decades the concept has been expanded to include newer and multiple forms of literacy, such as linguistic, visual, audio, spatial, and gestural literacies, but to date the type of relationships between the traditional and new literacies has not been established (Deshler, Ihle, Carrie, Pollitt, & Kennedy, 2012).

Bawden (2001) emphasizes that reading encompasses cognition, so that it can be considered as a continuum from simple reproduction of letter combinations at the low end to higher-order thinking and reasoning at the top end; he also notes that a high level of literacy has long been regarded as an indication for a high level of education or learning, and that "more recently, it has taken on a more prosaic meaning, that of being able to make effective use of *information*,

gained from written material" (emphasis in original). In the context of the information society, where print information is complemented with and partly replaced by digital or multimedia resources, the concept of literacy has changed and new phrases such as *information literacy*, *computer literacy*, or *media literacy* have emerged. This broader concept of literacy may refer to "the presence of more than rudimentary knowledge in a particular knowledge domain ... or a level of competence ... or an indication of the user's particular ideological position on literacy promotion" (pp. 222-223).

In these newer concepts the German translation for literacy is *competence* (*Kompetenz*). Both may be regarded as similar but not identical. In the German discourse about *media literacy* or its German translation *Medienkompetenz*, Tulodziecki notes that *Kompetenz* is rooted in Chomsky's concept of *linguistic competence* according to which each individual has an innate capacity for language production based on an immanent system of rules, and Habermas' expansion of it towards the notion of *communicative competence*, which includes verbal as well as non-verbal communication and is considered in his critical theory of society as both a prerequisite and result (Tulodziecki, 2011, p. 20; Tulodziecki & Grafe, 2012). Weinert (2001a) states that Chomsky's concept cannot be used outside the field of linguistics and one argument that he advances is the arbitrariness of the separation between competence and performance. Weinert (2001b) offers a definition that is widely recognized in education in German-speaking countries (Isler, Philipp, & Tilemann, 2010, p. 16); it states that competencies should be considered as the individuals' cognitive, learned or learnable dispositions (abilities and skills) for solving specific problems as well as the corresponding motivational, volitional, and social prerequisites and skills necessary for successful and responsible problem solving in variable situations. He distinguishes between subject-related, interdisciplinary, and action-oriented competencies (Weinert, 2001b, pp. 27-28).

Information literacy and media literacy

In Germany, both *information literacy* and *media literacy* or rather the German translations, that is, *information competence* (*Informationskompetenz*) and *media competence* (*Medienkompetenz*), are used but the latter is predominant (Gapski & Tekster, 2009; Freimanis, Orszullok, & Förster, 2013). Lux and Sühl-Strohmenger (2004) found that in German-speaking countries (Germany, Austria, and Switzerland) there had been almost ten-times more publications about media competence than information competence. In her review about the integration of information competence in German schools for DGI, Krähwinkel

(2007) noted that "often the term 'media competence' is used instead of 'information competence'" (p. 12).

Although the term *media competence* appeared already in Germany in the early 1970s as a key word in databases for one of Baacke's essays about new approaches in communication didactics (Gapski, 2001, p. 175), and in texts in the middle of the 1980s (Tulodziecki, 2011, p. 21), it started to play an important role especially in the middle of the 1990s, probably as a result of the spread of the internet and digital media (Gapski, 2001, p. 175; Schiefner-Rohs, 2012, p. 67; Tulodziecki, 2011, p. 21). Similar to information competence, media competence is a complex concept for which a multiplicity of definitions exists (Ballod, 2007, p. 281; Gapski, 2001). One of the first as well as one that has frequently served as a basis for others (Schiefner-Rohs, 2012, pp. 69–70) was offered by Baacke who distinguishes the following four components: media criticism, media knowledge, media use, and media production (Baacke, 1999). Aufenanger identifies six dimensions: cognitive, ethical, social, affective, aesthetic, and action (Aufenanger, 1999). And Tulodziecki summarizes media competence as "the ability and the willingness to deal with media in an adequate, autonomous, creative and socially responsible way" (Tulodziecki & Grafe, 2012, p. 49), and describes it on a more detailed level as "distinguishing and using appropriate types of media for a variety of purposes", "creating and disseminating own media", "understanding and evaluating the design of media messages", "becoming aware of and dealing with media influences", and "identifying and evaluating conditions of media production and media dissemination" (Tulodziecki & Grafe, 2012, p. 52; Tulodziecki, 1998).

In Anglo-American countries, the term *media literacy* tends to be used less than information literacy (Bawden, 2001, p. 220; Freimanis, Orszullok, & Förster, 2013, p. 34). A definition that has been widely accepted in the USA (Eisenberg, Lowe, & Spitzer, 2004; Koltay, 2011; Wijnen, 2008) is the one that was developed during the Aspen National Leadership Conference on Media Literacy in 1992 according to which media literacy "is the ability of a citizen to access, analyze, and produce information for specific outcomes" (Aufderheide, 1993, p. 6). Ten years later, the Center for Media Literacy expanded this definition and noted:

> Media Literacy is a 21st century approach to education. It provides a framework to access, analyze, evaluate and create messages in a variety of forms – from print to video to the Internet. Media literacy builds an understanding of the role of media in society as well as essential skills of inquiry and self-expression necessary for citizens of a democracy. (Thoman & Jolls, 2005, p. 21)

Bawden (2001), reviewing information literacy and related concepts, notes that media literacy "is used to imply critical thinking in assessing information gained from the mass media: television, radio, newspapers and magazines, and (increasingly) the Internet" (p. 225). Several German authors identify differences between the German concept of media competence and the English concept of media literacy, the first is considered as the broader concept (Moser, 2011, pp. 44–48; Wijnen, 2008, p. 116). Grafe (2011), analyzing the US literature, observes that media literacy is discussed as "empowerment", "critical literacy", "new media literacies", "visual literacy", and "media management", or "health literacy" (pp. 64-72); she also identifies differences between the German *media competence* and the English *media literacy*, but notes that when they are considered as a prerequisite for learning or an outcome of learning the underlying abilities and skills are similar (pp75-76).

Comparing information literacy and media literacy, Homann (2008) states that not only in Germany but more generally in Europe information literacy is not well established outside the library context and that in the fields of pedagogy and psychology, media literacy is prevalent (Homann, 2008, p. 96). Schiefner-Rohs (2012), based on Gapski and Tekster (2009), identifies various conceptual differences but also similarities. As far as differences are concerned, she finds media literacy to be based predominantly on theories of communicative competence and information literacy to have its roots in library and information science, especially in theories of information acquisition, and containing aspects derived from the psychology of learning. Media literacy includes media in all formats, whereas information literacy focuses on media typically available in libraries, such as articles, journals, and books, or online information. In terms of content, media literacy emphasizes that the access to and the production of content require critical and reflective thinking, whereas information literacy is oriented towards individual information problems. Media literacy is typically discussed for children and young adults and in the school context, whereas information literacy is discussed especially for students and by libraries. She describes the following similarities: in terms of underlying values, both refer to critical and responsible citizenship and both include the ability of critical thinking. Ballod (2005), on the other hand, observes that media literacy as well as information literacy include all types of media, and that media literacy is discussed for people of all ages. Mackey and Jacobson (2011) compare the aforementioned media literacy definition published by the Center for Media Literacy to standard information literacy definitions and observe that the notions of access, analysis, and location are included in both concepts, whereas the creation of information and the active participation in digital environments are more fully developed in media literacy.

Information literacy is sometimes considered as being part of media literacy (Staug, 2011-2013, p. 592) but typically it is the other way round (Bawden, 2001, p. 225). Both concepts also tend to be used together. Gapski (2012) considers them as "conceptual siblings" that are both needed, on an individual as well as on an organizational level, but information literacy should be released from being reduced to a library concept and media literacy from being considered as dealing solely with information technology (p. 170). Multiple researchers or authors writing about practice on a national and international level combine both concepts, often abbreviated as MIL (Balceris, 2011; *Bibliothek und Information Deutschland*, 2011; Gapski & Tekster, 2012b; Lux & Sühl-Strohmenger, 2004; Schiefner-Rohs, 2012; UNESCO, 2011; Wilson, Grizzle, Tuazon, Akyempong, & Cheung, 2011; UNESCO, 2012).

Reading literacy

A widespread definition of reading literacy is that used in the PISA studies. The 2009 study, which dealt with student knowledge and skills in reading as a major focus and with mathematic and science as minor areas, defined reading as "the capacity of an individual to understand, use, reflect on and engage with written texts in order to achieve his/her goals, to develop his/her knowledge and potential, and to participate in society" (OECD, 2010, p. 23). The PISA definition, which was similar in previous studies, is narrower and less closely related to students' out-of-school reality than concepts of information literacy: The focus is on texts that are selected by teachers and then given to students so that it does not include the location of texts, based on a previously identified information need, and, as a consequence, does not include the ethical use of information (Umlauf, 2005b, pp. 8–9). However, although this is not apparent in the definition, the 2009 study included questions about the use of search engines for the identification of information, but only in the 20 countries that explicitly wanted to include this type of questions (OECD, 2010, p. 21). The shortcomings of the PISA definition in contrast to other definitions of reading literacy, as brought forward, for example, by Hurrelmann (2007), are not further explored here because they are not relevant for the present study. As far as information literacy is concerned and on a general level, Keller-Loibl (2012) sees a lot of similarities between conceptualizations of reading competence and information literacy models, claims that both reading literacy and information literacy are important, and that the first is a prerequisite for the second.

Table 2-2: IL and Competing Literacies

Concepts	Description
IL and ML	– In Germany, predominance of media literacy (*Medienkompetenz*) over information literacy (*Informationskompetenz*), especially in formal education – A multiplicity of definitions exist for ML, but they have common features – Similarities between IL and ML: o Both include values related to critical and responsible citizenship o Both are associated with critical thinking – Differences between IL and ML: o Roots: for ML = theories of communicative competence; for IL = library and information science, psychology of learning o Content: ML emphasizes critical and reflective thinking; IL emphasizes problem-solving (?) o Formats: ML includes all; IL especially library media (journals, books, internet) (?) o Digital environments: More strongly taken into account in ML than in IL o Target audience: For ML = children and young adults, in formal education, for IL: Students, in libraries (?) – ML is regarded as part of IL (?) – Trend: Combining both (MIL)
IL and reading literacy	– PISA definition: o = Understanding, using, reflecting on, and engaging with written texts o Does not include identification of information need, location of information, and ethical use of information – Reading literacy is considered as a prerequisite for IL
IL and other literacies	– Terms used by education professionals (apart from media literacy): study skills, digital literacy – Skill-based literacies (library literacy, media literacy, computer literacy) vs. information literacy and digital literacy – Digital literacy, ICT literacy, and cyber-literacy share with information literacy the notions of information access, use, and evaluation/critical reflection but IL definitions make less explicit reference to technologically rich and digital environments
IL as overarching concept	– IL can become the meta-literacy needed in digital environments – Main reason: IL (more than other concepts) is associated with critical thinking – IL includes information skills, library skills, media literacy, digital literacy, ICT literacy, cyber-literacy, and visual literacy – But, for becoming a meta-literacy, IL needs to be more explicit about objectives related to the production and sharing of knowledge in participatory digital environments – In Germany, IL less used as an overarching concept than in Anglo-American countries
IL as part of other overarching concepts	– Information fluency: includes IL, technological literacy, computer literacy, web literacy, media literacy and emphasizes the ability to move competently from one to the other; is more than the acquisition of skills – Transliteracy: expands literacy to all formats of media – Hyperliteracy: includes multiliteracies (that is, all types of media) and intermediality (emphasis on authenticity and critical, socio-cultural awareness that also questions the concept itself) – Others: 21st century skills, e-skills

Note. (?) = No unanimity in the literature

Other literacies

Numerous other literacies that are related to and in part also overlapping with information literacy can be identified. Herring (Herring, 2011) observes that, in addition to media literacy, teachers use concepts such as study skills, research skills, and digital literacy when they address aspects related to components covered by what LIS professionals call information literacy (p. 62). Ballod (2005) discerns between literacies and competencies with an emphasis on technologies, such as media literacy, computer literacy, internet literacy, surfing literacy, or online literacy; those emphasizing types of supply and contents, including library literacy and information literacy; and those with a focus on formats of reception or production, for example, multimedia literacy and visual literacy. The latter, *visual literacy*, refers to the ability to understand information presented in visual formats and to make meaning with images; it emphasizes the creation of information with an emphasis on the visual aspects and design. Visual literacy is not a new concept, it emerged at the end of the 1960s, but it has gained increased importance with the emergence of digital technologies (Mackey and Jacobson, 2011). Bawden (2001) distinguishes between skill-based literacies, such as library literacy, media literacy, and computer literacy, as opposed to information literacy and digital literacy. Mackey and Jacobson (2011) compare information literacy to digital literacy, ICT literacy, and cyber-literacy. *Digital literacy* refers to the access, critical evaluation, and use of resources found on computers or in digital environments; similarly, *ICT literacy* refers to the access, evaluation, use, integration, and creation of information in technological and digital environments; and *cyber-literacy* focuses on the internet and emphasizes its active and critical use as characteristics of active and informed citizenship. The authors conclude that the three concepts share with information literacy components such as information access, use, and evaluation, that is, critical thinking; a major difference is that technological and digital tools as part of the information environment are less explicitly referred to in information literacy definitions.

Information literacy as an overarching concept

Several authors discuss the use of information literacy as an overarching concept. In Germany, Homann (2000b) argues that information literacy encompasses library literacy, media literacy, and computer literacy (p. 971), whereas Hapke (2008) writes that “in Germany information literacy is not used as an umbrella term for the key competence in a digital society like it is often used in other countries” (p. 176). As far as Anglo-American countries

are concerned, Bruce (2002) notes that information literacy is referred to as both "one of a number of literacies" or "the overarching literacy essential for twenty-first century living" before she adds that it "is inextricably associated with information practices and critical thinking in the information and communication technology (ICT) environment". Breivik (2005) identifies it as "a broader concept" that should not be used interchangeably with other literacies such as computer literacy, media literacy, and visual literacy because it is, more than the others, "a kind of critical thinking ability" (p. 23). Probert (2009) notes that information literacy was used as a "broad concept" in a joint publication of the Ministry of Education and the National Library of New Zealand in 2002 and "embraces information skills, ICT skills, and library skills along with the problem-solving and cognitive skills, and the attitudes and values, that enable learners to function effectively in the information landscape" (p. 25). Mackey and Jacobson (2011) consider information literacy as the perfect *meta-literacy* for addressing the challenges of constantly changing (social) technologies because of its association with higher-order thinking and critical thinking (The relationship between information literacy and critical thinking is discussed in more detail in section 2.2.2.3). They see information literacy as a meta-literacy that combines information and (all types of) technology, but they also express the need to redefine information literacy. Standard definitions of information literacy typically refer to broader (technology-based) information environments, so that they include other literacies such as media literacy, digital literacy, ICT literacy, cyber-literacy, or visual literacy. But, for becoming a meta-literacy, information literacy definitions need to take into account the dynamic and fluid nature of information and be more explicit about goals related to the acquisition, active production, and sharing of information and knowledge in participatory digital environments.

Information literacy as part of other overarching concepts

Information literacy is also perceived as being part of other overarching concepts. Ballod (2005) identifies "e-skills" as one in Germany. Key skills that students should develop are also frequently referred to as "21st century skills" (American Association of School Librarians, 2007; Grunwald and Associates, 2010; Partnership for 21st Century Skills, 2011). Kerr (2010) observes a tendency to use *information fluency* instead of information literacy in order to expand the latter and include information technology competencies and web literacy, but she also finds that there is no unanimity among authors about the content of the new concept and the usefulness of its introduction (p. 25). However, Callison and Preddy (2006) offer the following definition: "Information fluency is the ability to analyze information needs

and to move confidently among media, information, and computer literacy skills, resulting in the effective application of a strategy or strategies that will best meet those needs" (p. 79). Mackey and Jacobson (2011) emphasize that information fluency shares with information literacy the objective of moving beyond skills toward a "deeper level of comprehension and engagement with ideas" (p. 66). Another rather new overarching concept is that of *transliteracy*, defined as "the ability to read, write and interact across a range of platforms, tools and media from signing and orality [*sic*] through handwriting, print, TV, radio and film, to digital social networks" (Thomas et al., 2007). It was developed in the context of cultural and communication studies and emphasizes that literacy does not refer only to written texts but to all media formats.

Kapitzke (2003a), who questions the predominant positivist epistemological orientation of information literacy in the school context and its neglect of "the socio-cultural, historical, and ideological processes of knowledge construction and justification" calls for a new *hyperliteracy*, which includes and expands the pedagogical theories of "multiliteracies" and "intermediality". The first would help to move away from an overemphasis on written and printed text towards a recognition and use of sound, visuals, gesture, and space as modes of representation and communication. The second would draw attention to the use of texts that are meaningful to students and the development of a critical awareness, which should be based on the concept of social justice and take into account the socio-historical and sociopolitical contexts in which information, knowledge, and media are used and produced, and the underlying assumptions and concepts of practices. Given the complex nature of the information environment, Bawden (2001) also sees the need to find an overarching literacy that should encompass not only all skill-based literacies but emphasize "understanding, meaning and context"; its name or label is of lesser importance, whereas its promotion "as a central core of principles and practice of the information sciences" is crucial (p. 251).

Overall, the literature review revealed an important number of concepts that compete with information literacy, and just as for information literacy, the definitions for these concepts vary partly considerably. However, the relationship between information literacy and these other literacies can be summarized as follows: Reading literacy is considered as a prerequisite of information literacy. As far as media literacy is concerned, it can be noted that it has different roots than information literacy and that media literacy is the more common term in Germany, especially among education professionals, whereas information literacy tends to be more commonly used among German library professionals and in Anglo-American countries.

Both media literacy and information literacy include critical thinking. Both include all types of sources although media literacy focuses more on the mass media and information literacy tends to emphasize library-related sources, including the internet; also, media literacy emphasizes the creation of messages and active participation in digital social communities, an aspect neglected in information literacy definitions. However, the literature review revealed a tendency towards combining both to a new concept abbreviated *MIL*.

Multiple authors discussed the use of an overarching concept. On the one hand, information literacy is regarded as the perfect meta-literacy for meeting the challenges of a constantly changing digital environment because of its close association with critical thinking. It is regarded as including not only reading literacy, visual literacy, and media literacy but also more technology-related literacies, such as ICT literacy, digital literacy, and cyber-literacy. But for becoming a meta-literacy, information literacy needs to define goals related to the acquisition, active production, and sharing of knowledge in technology-rich, participatory social communities more explicitly. On the other hand, information literacy is regarded as being part of other overarching concepts such as 21st-century skills, e-skills, information fluency, transliteracy, or hyperliteracy. The latter takes into account all types of media and emphasizes the notion of critical, socio-cultural awareness that also questions the concept itself.

This section began with a report about key definitions of information literacy, first as presented outside any models or standards and then as expressed through them. Then it discussed the concept of literacy, literacies that compete with information literacy and especially media literacy, which is the prevalent concept in Germany, followed by conceptions of information literacy as an overarching concept and finally alternative umbrella concepts that include information literacy. The next section reports the major literature about information literacy learning.

2.2.2 Information Literacy Learning

The main interest of this section is to review important literature about information literacy learning. On a general level, Gudjons (2006) defines *learning* as permanent changes in behavior based on experiences. He distinguishes between two types of learning theories, behaviorist or associationist theories, which perceive of learning as being externally controlled so that changes are the consequence of external stimuli and directly observable, and theories of cognitive organization, for which learning is internally controlled and directly

observable changes in behavior are indications for changes in cognitive structures (p. 210). The first subsection reports what the literature says about learning with information. The second and most comprehensive subsection reviews texts about the three learning theories that are most frequently discussed in the LIS literature: behaviorist, constructivist and relational theories. In the third and last subsection learning about information in the forms of critical thinking and critical information literacy are discussed.

2.2.2.1 Learning with information

This subsection discusses definitions of the concept of information, the data-information-knowledge-wisdom hierarchy, and types of learning with information in the school context.

Information is seen to be crucial for learning (Eisenberg, 2008, p. 39) with a myriad of definitions being proposed (Bates, 2009). A broad version is offered by Case (2012) who states that "*information* can be any *difference* [an individual] perceive[s], in [his] environment or within [him]self" (p.4) (emphasis in original). Bates (2009) reviews definitions and theoretical constructions from information science and related fields and organizes them in seven categories, including (1) communicatory or semiotic, (2) activity-based, (3) propositional, (4) structural, (5) social, (6) multi-type, and (7) deconstructionist. She observes that "any claim to present a unified, singular vision of the topic would be disingenuous". Ingold (2011), in her effort to provide a contribution to the development of a theory of information literacy, also reviews definitions of information in various disciplines and concludes that the following elements of information are crucial: information is the content of human communication, which can be but is not necessarily supported by (mass)media; information is semantic and transports meaning; information can be everything that is or has the potential to be informative for human beings in a particular context and includes information that is or can be stored in information systems but also other types of externalized information, for example, information that is expressed orally or through actions; information is an active or passive process through which a person becomes informed in a specific context or informs himself and/or others; information is all that is considered as useful or usable individual or collective knowledge in a particular context and which is or can be made available in an externalized form so that it can be used as a basis for learning, processes of making decisions, and gaining insights. She suggests the inclusion of a particularistic perception, according to which information is seen as the entirety of information or as (potential) answers to (potential) questions. She also emphasizes the need to adopt a socio-

cultural perspective, arguing that definitions and models of information are developed in different disciplines so that librarians should move beyond a library to a contextualized approach of information literacy (pp. 59-64). Similarly, Treude (2011) does not consider it as useful or realistic to find a universally applicable definition of information; instead, she suggests to establish, for each context separately, what is or what could be considered as information. And the questions should be what does or what could function as information rather than questions about the essence of information (p. 39).

Descriptions of information are closely related to learning theories. Using a relational approach to information literacy learning and teaching, Bruce et al. (2006) propose the use of six frames, for all of which information is described in a different way: according to the *content frame* information is objective in nature, "exists apart from the user [and] can be transmitted"; according to the *competency frame*, "information contributes to the performance of the relevant capability"; according to the *learning to learn frame* information is subjective in nature and "internalised and constructed by learners"; according to the *personal relevance frame* "valuable information is useful to the learners"; according to the *social impact frame*, "information is viewed within social contexts"; and according to the *relational frame*, "information may be experienced as objective, subjective, or transformational". Developing, from a constructivist perspective, a theoretical framework for information literacy that can be applied in a variety of settings, including, but also beyond, formal education, Todd (2000a) requires giving up the overemphasis on the literacy or learning part of the concept in favor of the information part. He emphasizes the highly subjective and transformational character of information and notes that "information is that which enables people to construct sense of their information world, to use it to solve problems and to get on with their lives".

The widespread hierarchy *data, information, knowledge*, and sometimes also *wisdom*, with data the least and wisdom the most processed or integrated, is highly questioned. It is rooted in popular usage and founded on common sense rather than on a sound empirical basis (Bates, 2009; Case, 2012, pp. 72–73; Ingold, 2011, p. 46). However, information and knowledge are found to be closely related and partly overlapping, but only as far as explicit, representative, collective, and codified knowledge is concerned. At the same time, information is more than knowledge and knowledge more than information. Also, a person's whole knowledge is not necessarily based on information, and each piece of information is not necessarily based on knowledge. Information is in the first place a form of communication rather than a form of knowledge (Ingold, 2011, p. 53), or, as Case (2012) states, "knowledge ... is strictly a

phenomenon of the human mind, whereas data and information are often represented by tangible, physical objects" (p. 73).

As far as learning *with* information in the school context is concerned, two major types can be discerned: an *objectivist* and a *constructivist*. According to the former, students passively receive information or knowledge from teachers, are expected to replicate it, and to come to the same understanding as their teachers; according to the latter, students individually and socially build their own knowledge. Types of learning with information that are frequently discussed in the LIS literature for enhancing student construction of subject knowledge are inquiry learning, problem-based learning, authentic or meaningful learning, resource-based learning, and cooperative learning (Callison & Preddy, 2006; Eisenberg, 2008, pp. 95–99; McGregor, 1999, pp. 35–37). The concept of knowledge is further explored in the next subsection, and especially under constructivist learning theories.

2.2.2.2 Behaviorist, constructivist, and relational IL learning

The LIS literature discusses three learning theories with regard to information literacy learning, especially constructivist as opposed to behaviorist (Gordon, 2009; Herring, 2011, pp. 4–6; Lau, 2006, pp. 35–41; Loertscher, 2000, pp. 30–32; McGregor, 1999) and to a lesser extent also variation theory, which is based on a relational perspective on learning (Andretta, 2012; Bruce, 1997). In the following, learning in general, and then information literacy learning, is defined in the context of each of the three schools of thought, beginning with behaviorism. Table 2-3 provides an overview.

Information literacy learning according to behaviorist theories

Behaviorism is a movement in psychology that appeared in the early twentieth century when researchers sought to improve the quality of scientific studies by giving up mere descriptions for analyses of observable and measurable behavior (Seel, 2012, p. 438). A key founder of behaviorist learning theories is Pavlov with his work about learning as a reaction to a stimulus, called *classical conditioning* (Gudjons, 2006, p. 211). Based on Pavlov's discoveries, Watson defined human learning as acquisition of behavior "whereby a new stimulus substitutes for a natural stimulus in producing a response" (Phillips, 2012). Another important founder is Skinner, who, based on Thorndike's "law of effect" and "law of exercise", developed a theory of *operant conditioning* according to which behavior is shaped

by its consequences (Phillips, 2012), through a stimulus that is presented after the learner has shown a particular reaction (Gudjons, 2006, p. 212). In the school context, learning according to behaviorism is a reaction to stimuli imposed by the teacher, the reaction being evaluated by the latter. It implies that students passively receive information and relies heavily on rote learning as well as verbatim learning (Gordon, 1999). Originally a behavioral theorist, Bandura combined elements from behavioral with cognitive theories in his notion of "observational learning", according to which imitation of observed behavior is not a simple repetition but occurs as a consequence of considerable cognitive processes (Gudjons, 2006, pp. 214–215).

On a general level, behaviorism has been criticized for its strong determinism, that is, considering behavior as only being the result of external stimuli, for its restriction to observable behavior, for its ignorance and even devaluation of the inner life of the learner, for its perception of learning as small isolated sequences rather than as part of an encompassing process of personality development, for its ignorance of the activity aspect in human behavior, and for not adopting a critical view on the social aspects of environmental conditions (Collins, 2008; Gudjons, 2006, pp. 151; 214).

Behaviorist information literacy learning is the acquisition of skills and attributes related to information literacy. It was described, as such, for example, in the early ALA definition (American Library Association/Presidential Committee on Information Literacy, 1989), in various standards (American Association of School Librarians and Association for Educational Communications and Technology, 1998a; Association of College and Research Libraries, 2000), by Doyle'(1992), or in models, for example, the Big6 (Eisenberg & Berkowitz, 2000), although the authors of this model emphasize that it should not only be perceived as a set of skills but as a process as well (Eisenberg & Berkowitz, 2011, p. 116). Taking a behaviorist approach to information literacy learning has been criticized for being reductionist and mechanistic (Kerr, 2010, pp. 26–27), for being based on a deficit model (Kapitzke, 2003a; Kapitzke, 2003b), for neglecting context and the importance of the learner's interaction with other people (Limberg & Sundin, 2006), for enhancing surface learning, that is, memorization and reproduction of content, rather than deep learning that involves the development of a personal understanding (Johnston & Webber, 2003), and for presenting information literacy as a series of logical steps, neglecting individuality and variety by describing ideal and best behaviors, and neglecting student knowledge creation (Markless & Streatfield, 2009).

Table 2-3: Theories of Learning and IL Learning

	Behaviorism	Cognitivism and Constructivism	Variation theory
Learning	– Learning is a change in behavior. – Learning is a reaction to an external stimuli that is presented prior to the reaction (classical conditioning) or after the reaction (operant conditioning).	– Learning is a change in knowledge based on experiences and interactions with the environment; – Is an individual and social process of construction; – Is based on prior knowledge and experiences; – Involves thoughts, actions, and feelings; – Begins with confusion; – Is a process of sense making; – Is deep and meaningful learning, which can be the result of both discovery and receptive learning.	– Learning is a change in the relation between the learner and the world; – Is discerning a phenomenon in new or more complex ways, various conceptions of a same phenomenon completing each other; – Learning encompasses an understanding of the quality of conceptions and their appropriate use; – Learning is deep and transferable.
Information literacy learning	Is the acquisition of skills and attributes related to information literacy.	– The information search process (ISP) is a holistic process of building knowledge from a variety of sources; – The ISP encompasses actions, thoughts, and feelings, – The ISP typically begins with uncertainty accompanied by confusion; – IL is a prerequisite of the ISP; – Developing IL is learning to communicate in a variety of social practices and includes critical reflection about the concept of IL; – Becoming information literate is a holistic process of becoming an expert in a particular context.	– Gaining new and more complex conceptions of IL; – Making experiences with information and the information environment in multiple ways; – Knowing on which conception(s) and experience(s) to rely in a particular situation.

Information literacy learning according to cognitive and constructivist theories

According to cognitive learning theories, learning is a change in knowledge based on experience. It is both different from behaviorism, which considers learning as a change in behavior, but also related to it in the sense that cognitive changes must be deduced from the learner's behavior. Five types of knowledge can be distinguished: (1) facts; (2) concepts, including models, schemas, categories, or principles; (3) procedures or step-by-step processes; (4) strategies, that is, general methods for accomplishing a goal; and (5) beliefs. For reaching proficiency with complex tasks, several kinds of knowledge are needed (Mayer, 2012).

Constructivists understand learning, in brief, “as a process of personal and social construction where people are actively involved in making sense of information they interact with, rather than passively receiving it” (Todd, 2006; Kuhlthau, 2004). Crucial for the development of constructivist learning theories are the works of Dewey, Kelly, Piaget, Vygotsky, and Bruner (Gogus, 2012; Kuhlthau, 2004; McGregor, 1999). In the first decades of the twentieth century, Dewey, predominantly a philosopher and educational reformer who stated that the aim of education should be to prepare students for working, acting as citizens, and living in a free society, emphasized that learning is an active individual process of construction that implies reflection and, as such, results in deep understanding that can be transferred to other situations. His notion of *reflective thought* states that learning begins with some confusion or perplexity and includes thoughts, actions, and feelings (Dewey, 1997, pp. 6; 9). Kelly, a clinical psychologist, verified and defined constructivist learning theory in the 1950s and 1960s. His *theory of personal constructs* states that constructs are created based on a person's experience and for anticipating future events; internal constructs, rather than external stimuli, shape human behavior. The process of construction happens in five phases, beginning with confusion and doubt, and he explicitly described the interaction of affective with cognitive and physical aspects. He also found that during construction an individual has to make various choices based on their predicted outcome; the choices, which are neither obvious nor ordered, are directed toward finding meaning and making sense of the world (Kelly, 1963).

An important contribution to cognitive learning theories was also made by Ausubel (1968) with his notion of *meaningful learning*, according to which learning occurs “if the learning task is related in a nonarbitrary and non-verbatim fashion to the learner's existing structure of knowledge” (p. 126). However, different from the previously mentioned authors, who highly valued discovery learning, he gave preference to receptive learning, according to which students receive information from teachers. He argued that both receptive and discovery learning can lead to rote and meaningful learning, that discovery learning encompasses the risk to be in discordance with the cognitive developmental stages of students, is particularly suitable only for high-performing students, and is too time-consuming (Ausubel, 1964).

As far as education is concerned, Gogus (2012) states that the two most important directions of constructivism are cognitive constructivism and social constructivism, which despite their differences share major perspectives about learning. *Cognitive constructivism* is based predominantly on the theory of children’s cognitive development presented by Piaget in the early 1970s and his perception of knowledge as being built through experiences and

interactions with the environment. Experiences or interactions lead to changes or expansions of cognitive structures, that is, schemas and mental models, through the complementary mechanisms of (cognitive) adaptation, organization, and equilibration. Cognitive adaptation is the result of two interrelated processes: assimilation, according to which the learner integrates new information into his mental models, and accommodation, according to which the leaner changes his mental models based on the new information (Piaget, 2010). Cognitive organization refers to the learner's ability to structure his observations and experiences in meaningful ways and cognitive equilibration refers to the learner's pursuit of a balance between assimilation and accommodation (Jank & Meyer, 2008). *Social constructivism* is rooted in Vygotsky's work who considers culture and social context as being crucial for knowledge building (Gogus, 2012). He identified a *zone of proximal development*, that is, the distance between the level that a student can achieve when learning independently and the level he can achieve when assisted by professionals or peers (Vygotsky, 1978, p. 86).

Bruner verified and refined the findings of Dewey, Piaget, Vygotsky and others, and stated that learning is an active and highly individual process of sense making, is based on prior knowledge, and encompasses organization and categorization. He considered the interpretative task as being a crucial part of the construction process, emphasizing the value of intuitive in addition to analytical thinking, the first of which unlike the second does not happen in a systematic or straightforward way; it involves the creation of products of mind, and includes thoughts, actions, and feelings (Bruner, 1977). A broader perspective on the development of knowledge and learning was taken by Gardner with his theory of multiple intelligences according to which each individual has intellectual capacities to varying degrees in a whole range of areas, including linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, and personal (Gardner, 2011); his theory is in constant revision and expansion (McGregor, 1999).

As far as information literacy learning is concerned, Kuhlthau was one of the first and is today one of the most widely recognized proponents of a constructivist perspective. She borrowed theories about learning from the aforementioned constructivist theorists and researchers for formulating a preliminary theory of information processing, which she tested and refined in numerous studies (Kuhlthau, 1989; Kuhlthau, 1997; Kuhlthau, 2004; Kuhlthau, Maniotes, & Caspari, 2007, p. 21; Kuhlthau, Heinström, & Todd, 2008); an important result is her model of the ISP (see section 2.2.1.1 for further details). At a time when the behavioral skills approach towards information literacy was still predominant, Kuhlthau noted that the main outcome of

an information search process is learning (Kuhlthau, 1993a) and later she stated that "the central goal of information literacy is to instill in students a sense of the process of learning from a variety of sources of information and skills to construct their own understandings from that information" (Kuhlthau, 2004, pp. 58; 164). She suggests the implementation of "inquiry learning", which helps students to learn simultaneously about subject content, information literacy, the learning process as based on her ISP model, literacy, and social competence (Kuhlthau, Maniotes, & Caspari, 2007, p. 112).

One of Kuhlthau's major contributions was the adoption of a holistic view and to pay attention not only to the actions and thoughts but also to the feelings which a user experiences when undertaking a more complex information search (Kuhlthau, Heinström, & Todd, 2008). She identified a close relationship between affective and cognitive aspects that she formulated, based on Kelly's personal construct theory, in the *uncertainty principle*; it describes the evolution from uncertainty to understanding during the information search process:

> Uncertainty is a cognitive state that commonly causes affective symptoms of anxiety and lack of confidence. Uncertainty and anxiety can be expected in the early stages of the information search process. The affective symptoms of uncertainty, confusion, and frustration are associated with vague, unclear thoughts about a topic or question. As knowledge states shift to more clearly focused thoughts, a parallel shift occurs in feelings of increased confidence. Uncertainty due to a lack of understanding, a gap in meaning, or a limited construction initiates the process of information seeking. (Kuhlthau, 2004, p. 92)

With this principle, Kuhlthau explains that uncertainty is a natural part of the information seeking experience, not a symptom of increased problems. Familiarity with the principle of uncertainty is helpful not only for information users themselves but also for mediators, such as librarians or teachers, assisting users (Kuhlthau, 2008, p. 68). Still based on Kelly, Kuhlthau (2004) highlights the importance of predictions and the choices based on them for knowledge building during an information process (pp. 100-101).

Kuhlthau saw in her studies that the early stages in the information search process are crucial, especially the phase of exploration, during which the most significant portion of learning occurs but which is also typically experienced as the most difficult, and accompanied by a high level of uncertainty, anxiety, and frustration because students may encounter information that is contradictory or inconsistent and incompatible with their prior understanding. Consequently, there is a high risk that users abandon a research task at this point. She also

found that users who skip the phases of exploration and formulation collect facts to support their existing knowledge rather than building new knowledge (Kuhlthau, 1993a, p. 349). Research about students' use of the ISP in the digital environment showed that the easy availability of huge amounts of information enhanced the risk that students skip theses stages; those who did so were more likely to experience frustration at the end of the process and to have built superficial, descriptive rather than deep knowledge (Kuhlthau, Heinström, & Todd, 2008).

Based on constructivist learning theories and Kuhlthau's work, Todd (2000b) identifies three crucial components of information literacy and the corresponding elements: connecting with information, interacting with information, and using information. Also in 2000, he offered "a theory of information literacy" that emphasizes the information rather than the literacy part of the concept, which was prevalent by then (Todd, 2000a). His theory is composed on the following four assumptions, which are derived from research in constructivism and information science:

1. Information literacy presents a view of people as active consumers of information rather than passive, robotic vessels into which information is poured.
2. Information literacy is primarily about human information processing, where people employ a range of cognitive processes to effectively interact with information.
3. Information literacy is built on a constructivist and subjective conception of information, where information is that which enables people to construct sense of their information world, to use it to solve problems and to get on with their lives.
4. Information literacy is about enabling the purposeful utilisation of information to some effect (pp. 164-165).

The concept of *information use*, which is found in the majority of information literacy definitions, models, and standards, is closely related to constructivist learning when it is understood in the way Wilson (2000) defines it, that is, as including both physical and mental acts for integrating the found information into the previously developed knowledge base (p.50). Crucial are the mental processes and the building of new knowledge (Tanni & Sormunen, 2008, p. 896).

Socio-cultural approaches distinguish between knowledge inside and knowledge external to an individual; they emphasize that knowledge is also socially constructed and that "information literacy practices intersect with variables of gender, class, religion, culture and ethnicity to generate different learning outcomes in different contexts" (Kapitzke, 2003b, p. 6). For them, becoming information literate includes learning how to communicate in different social practices and encompasses meta-cognitive activities in the sense of reflecting

about what it is like to be information literate in different practices, and in the sense of analyzing critically the concept of information literacy itself. In the school context, these social practices include, for example, those of the school as such as well as those of the different disciplines (Limberg, Alexandersson, Lantz-Andersson, & Folkesson, 2008, p. 84; Lundh & Limberg, 2008, pp. 93–94). Based on an investigation about workplace information literacy, Lloyd (2006) moves beyond the notion of practice and uses the concept of landscape for referring to the context or the information environment; landscapes do not only include practices but also activities, artifacts, opportunities, and symbols. According to her, becoming information literate is the process of becoming an expert in a particular landscape and requires the development of "a deep awareness, connection, and fluency with the information environment". Becoming information literate is not only a cognitive but a holistic process; she notes that "information literate people are engaged, enabled, enriched and embodied by social, procedural and physical information that constitutes an information universe" (p. 578).

Apart from Kuhlthau, but frequently based on her work, numerous other researchers investigated students' engagement with information and identified different types of knowledge development. In a cognitive study, using a quasi-experimental approach, about four adolescent girls' use of information about the drug heroin in a curriculum-related task, Todd (1999b; 2005a) found the following five types of information intents: getting a complete picture, getting a changed picture, getting a clearer picture, getting a verified picture, and getting a position in a picture. Limberg (1999), in a phenomenographic study with 25 students in their last year of high school undertaking a research assignment, found that they experienced information seeking and use predominantly in one of the three following ways: "fact-finding", that is, finding the right answer; "balancing information in order to choose right", that is developing a personal point of view; or "scrutinizing and analyzing", that is, developing an understanding of their topic (Limberg, 1999). In a quantitative study Heinström (2002) identified three types of information users among university students (N=305) who were writing their master thesis: fast surfers, broad scanners, and deep divers. She found a relationship between personality, the approach to studying, and the information seeking behavior. Her findings were confirmed in a mixed methods study in ten schools with middle and high school students (N=574) undertaking guided inquiry research projects using the ISP. She emphasized that a surface and a deep approach are not necessarily contradictory; their occurrence may not only depend on an individual's overall inclination but also on the task, the context, and the individual's motivation (Heinström, 2006). In the context of the same extensive mixed methods study Todd et al. reported about students building new knowledge

and identified two main approaches: an additive approach, according to which the newly developed knowledge occurred on a descriptive level and was expressed through lists of categorized facts, and an integrative approach, according to which facts were used in explanations, synthesized in more abstract categories, organized more coherently and for developing personal conclusions. They correspond to Limberg's fact-finding, respectively scrutinizing and analyzing (Todd, Kuhlthau, Heinström, & Bird, 2005; Todd, 2006).

A relational perspective on information literacy learning (variation theory)

Variation theorists negate the separation between an inner, subjective world and an outer, real world. Marton and Booth (1997) note that "the world is not constructed by the learner, nor is it imposed upon her; it is *constituted* as an internal relation between them. There is only one world, but it is a world that we experience ..." (emphasis in original) (p. 13). They consider learning as a change in the relation between a person and the world (Andretta, 2012, p. 28) and in more detail as "changing a learner's structure of awareness of a phenomenon, or, in other words, helping the learner to discern a phenomenon in new or more complex ways – ways that are deemed appropriate by the teacher" (Orgill, 2012, p. 3391). Thus, learning involves three aspects: discernment of critical features of a phenomenon, variation, and experiences, first on the individual level, then on the collective level and simultaneously. Variation can be experienced through contrast, generalization, separation, and fusion (Orgill, 2012). Successful relational learning leads to deep and transferable learning (Andretta, 2012, p. 24). Bruce (1997) describes the evolution from a hierarchical perspective on relational learning, which was predominant until the early 1990s and considered learning as a change from one conception to another, better or scientifically more accepted one, to a variational perspective, according to which learning means gaining different conceptions of the same phenomenon, which complete each other, and which includes an awareness of the quality of conceptions and their appropriate use (p. 168).

Becoming information literate is described by Bruce (1997) as gaining new and more complex conceptions and experiences of information literacy (p. 174). For her, information literacy learning is about developing conceptions, making experiences with information in a variety of ways, and to know, on which one to rely in a new situation. She does not exclude the acquisition of skills and knowledge but it is secondary and happens "within a broader framework of learning to conceive of effective use of information in different ways" (p. 169). Similarly, other perspectives on information literacy, for example, seeing information literacy

as “knowledge about the world of information”, as “a way of learning”, “as contextual and situated social practices”; or as “power relationships in society and social responsibility” are not considered as competing conceptions but as variations of a same phenomenon (Bruce, Edwards, & Lupton, 2006, pp. 5–6). Variations in conceptions of a phenomenon are typically investigated in phenomenographic studies; several of these studies about teachers’ conceptions of information literacy are reported in section 2.3.

This subsection showed that information literacy learning varies considerably depending on the underlying learning theory. As Table 2-3 shows, information literacy is either regarded as the acquisition of skills and attributes related to information literacy (behaviorism), or as a context-dependent individual and social process of building knowledge from a variety of sources that requires critical reflection about the concept of information literacy itself (constructivism), or as developing and expanding conceptions of information literacy, making experiences with information literacy, and knowing which conception(s) and experience(s) to use in a particular situation (variation theory). The relationship between information literacy learning and critical thinking is discussed in more detail in the next subsection.

2.2.2.3 Learning about information

This section discusses primarily the literature on the concept of critical thinking and its extension critical information literacy, and, to a lesser extent, its relationship with the concept of creative thinking. As could be seen above, *critical thinking* is referred to in many information literacy definitions, models, and standards. In the (school) library practice, it has been taken into account to varying degrees so that in the context of encouraging librarians and teachers to move beyond a skills approach, numerous authors have emphasized that information literacy and thinking are inextricably linked. For example, Gordon (2002b) states that research is more than searching and presenting information, it is thinking in the first place (p. 19). Todd (2003a) notes that “the inquiry process is a thinking process” (p. 34). And Loertscher et al. (2005) emphasize that students should be required to think about the information they gathered in the form of an analysis, and to utilize the information in the form of a synthesis (pp. vii-viii).

Multiple definitions of critical thinking can be found in the literature. McGregor (1999) emphasizes that it uses strategies of but is different from higher-order thinking and that the majority of critical thinking definitions include two components: decision making and

improving thinking (pp. 42-43). Tanni (2008) explains that critical thinkers "tend to perceive multiple interpretations of each situation, acknowledge that some things are contradictory, engage in reasoned evaluation of information supporting different interpretations, and develop personal commitment to one interpretation or synthesize competing interpretations" (Tanni & Sormunen, 2008, p. 899).

Schiefner-Rohs (2012) notes that the concept is closely related to pedagogy, has its roots in the ancient world with the Greek philosophers Socrates, Plato, and Aristotle, and that it is considered as important particularly in the USA, where there has been a long and intense discourse about it. Critical thinking was brought into focus there in the early 20th century by Dewey with his notion of reflective thought, and she distinguishes two major movements, which merged in the 1980s: one beginning in the 1950s when critical thinking was fostered for enhancing scientific and technological thinking in the context of the military and economical competition with the Soviet Union, and another more liberal one that started in the 1960s and focused on a critical analysis of political and ideological messages, manipulations, and influences. She compares definitions from authors in different countries and identifies several similarities and differences. Common to all definitions is that they strive to improve thinking and that they focus on the questioning of statements and information as expressed through various types of media. According to her, the concept of critical thinking includes the competencies of interpreting, analyzing, evaluating, reasoning, explaining, examining, presenting, self-regulating, and deducing. The majority of definitions include not only cognitive processes but, in addition, dispositions and traits, and she claims that all authors emphasize that critical thinking is a crucial ability. Differences of definitions are related to the context in which they are developed: definitions of critical thinking that emerged in the discipline of philosophy focus on enhancing argumentation and informal logic; psychological definitions focus on the development of meta-cognition and reflection; and those rooted in critical pedagogy emphasize context. Major criticisms of definitions are their heterogeneity, the arbitrary and normative rather than empirically verified compilation of their components, and the variety in terminology (pp. 85-103).

As far as the relationship between critical thinking and information literacy is concerned, either the latter is regarded as being part of the former (Loertscher & Woolls, 1997) or vice versa (Schiefner-Rohs, 2012, p. 115). Kapitzke (2003b), on the other hand, sees the need to move beyond the concept of information literacy towards *critical information literacy* or even *critical information literacies*. She argues that enhancing critical thinking in the sense of

identifying deficits in faculty, logic, and argumentation is not enough; the focus should be on ideology and the socio-economical and sociopolitical dimensions of ideas and information (pp. 8-9). In line with her, in Germany, Hapke (2012) emphasizes that the goal of information literacy education should be "critical" rather than "functioning" citizens (p. 40) and that regardless of the denomination of the concept, for example, information literacy, media literacy, digital literacy, or information culture, and regardless the type of information environment, that is, print, web 2.0, or something in-between, essential is a critical attitude, which requires solid background knowledge about the development, functioning, societal, and social challenges of modern information and communication processes and their tools (p. 47-48). Several years earlier he had introduced the concept of "Information Literacy 2.0" as an alternative to the predominant library-focused perspective in the country, with an emphasis on critical thinking rather than on the use of social software or technology. The concept is supported by the following five statements: information literacy (1) requires a holistic approach; (2) is one of a number of key competencies; (3) is a learning experience; (4) encompasses both learning with information as well as learning about information and knowledge; and (5) makes use of web 2.0 tools (Hapke, 2007; Hapke, 2008). Also in the context of web 2.0, Asselin and Doiron (2008) state that school libraries need a new, "transformative pedagogy", and that students, in addition to basic literacy skills, should become competent in five areas: technological literacy, inquiry and problem solving, ethics and social responsibility, creativity and representation, and critical literacy. The latter directs the focus of students' learning towards the authors of and their reasons for producing and presenting knowledge; authenticity and reliability of sources; manipulation through as well as of media; identification of the tools that best meet learning needs; recognition of their global and social responsibilities, and being active citizens in a democracy (pp. 8-9).

Another type of thinking that is frequently discussed together with that of critical thinking is *creative thinking*; both are partly overlapping. McGregor (1999) observes that although definitions are high in number, the concept "involves generating new ideas and putting existing ideas together in new ways", and contains two types of thinking: divergent, in the sense of developing novel ideas, and convergent, that is, identifying the most appropriate idea (p. 43). He states that convergent thinking partly overlaps with critical thinking and Schiefner-Rohs (2012) reports that the relationship between the two is not clear (p. 89): sometimes creative thinking is seen as being included in critical thinking (p. 85) but it is also seen as being one part of more complex thinking processes, side by side with critical thinking and content-related thinking, all three of them being interrelated (p. 91).

In this section, both important concepts for learning with information and about information were discussed, but the main focus was on behaviorist, constructivist, and relational learning theories. The next section discusses major texts about the teaching of information literacy.

2.2.3 Information Literacy Teaching

This section of the report discusses important literature about information literacy teaching. *Teaching* can be broadly defined as "the process of educating or instructing learners" and "as an art or science, in which context pedagogy is a synonym" (Crook, 2008, p. 589). Methods for classroom teaching are referred to "as pedagogical strategies used in teaching" (p. 589). The use of the concept of *instruction* is ambiguous. On the one hand numerous authors tend to use it as a synonym for teaching, as in the aforementioned definition. At the same time it is defined by others, for example, by McCulloch (2008) as "a requirement, either written or oral in form, with which the recipient is expected to comply, for example when a teacher tells a pupil or class to complete an exercise or to stop working" and in a more broad sense as "the passing of knowledge from a teacher or lecturer to an individual or group" (p. 317). He further notes that instruction tends to be centered on the teacher rather than the student and contains a directive element as well as the notion of knowledge transfer rather than those of critical thinking and knowledge building. In the present literature review, instruction is used only when the authors, whose texts are discussed, explicitly employed the term.

Grassian and Kaplowitz (2001) note that the concept of information literacy grew in the context of instruction and that *information literacy instruction* is (1) either considered as a "natural progression ... that subsumes all previous concepts and adds additional nuances of meaning" (p. 3), previous concepts include library orientation, library instruction, bibliographic instruction, and user education, or (2) as "a new concept ... that represents a new way of thinking" and that (3) others see it just as "a new name for what [they] have always done" (p. 4). In his historical review Herring (2010) writes that in the 1980s the term *information skills*, which had been widespread in many countries in the 1970s and 1980s, started to replace *user education*, especially in schools. And by the 1990s, the broader concept of information literacy had started to be used but the concept of information skills was predominant in the literature related to schools (pp. 19-25). In the late 1980s, Kuhlthau identifies three types of instruction in school libraries: a source approach, which concentrates on students becoming familiar with their own library and developing location skills; a pathfinder approach, which includes both the location of information and its use and was

developed by Knapp in the 1960s in order to help students to perceive the library as "a system of ways" and to find their own way through the library; as these two approaches neglect the reasoning and the thinking skills inherent in independent learning, Kuhlthau suggests a third type, the process approach, according to which students engage in inquiries and not only search for information but especially use and interpret it so that they learn from it (Kuhlthau, 1987).

Information literacy teaching has been influenced by behaviorist and constructivist theories (Gordon, 2009, pp. 58–89; Loertscher, 2000, pp. 30–32), and to a lesser extent also by relational theories (Andretta, 2012; Bruce, 1997); the three types are discussed in the first subsection. Then key texts about the use of models and standards in information literacy teaching and about the assignment of research tasks are reviewed.

2.2.3.1 Behaviorist, constructivist, and relational IL teaching

This subsection discusses information literacy teaching approaches, first according to behaviorist, then according to constructivist, and finally according to relational theories. Table 2-4 provides an overview.

Information literacy teaching according to behaviorist theories

According to behavioral teaching theories, behavior is shaped by consequences that are contextually relevant. Sulzer-Azaroff (1995) further notes that extensive research shows that increased levels of academic, motor, social, and professional performance can be achieved when several principles are applied properly. On a general level, he cites immediate, sufficient, and repeated reinforcement as well as chaining, shaping, and controlling. Principles pertaining to a diminishment of behavior include reinforcing wanted co-existing behaviors, not strengthening unwanted behavior, unwanted behavior being followed by unpleasant or aversive consequences, and making a student engage in preliminary activities that help him to avoid the unwanted behavior. Principles that enhance the transfer of behavior to new situations include positive reinforcement, reinforcing features that are common to all new situations, same behavior being learned and reinforced in a variety of situations, and reinforcement by natural circumstances. Principles according to which behavior is maintained include students mastering expected behavior fully and fluently under appropriate conditions, gradually diminishing positive reinforcement without stopping it completely, and gradually

removing artificial prompts. The proper application of these different principles requires a clear identification of instructional objectives, assessing behavioral changes repeatedly with previously defined valid and objective measures within and across sessions and at individual as well as programmatic levels, using precision teaching, and making use of eco-behavioral assessment. Models and programs of behavioral teaching that have proven to lead to success and are widely applied include token economics, peer tutoring, group management methods, social skills training, programmed instruction, personalized system instruction, and precision teaching.

Teachers who teach based on behaviorist teaching theories exert a high level of control on the learning environment, deliver expected content to students, especially in lectures or through the use of textbooks, assess student learning of prescribed subject content in tests (Loertscher, 2000, p. 30), draft steps for helping students to learn expected behavior, and are not concerned with the internal aspects of learning (Gordon, 2002b). Instruction that promotes rote learning through classroom recitation has played an important role since the early twentieth century (Sprinthall, 1995, p. 102).

In the LIS literature, information literacy teaching based on behaviorism has been strongly criticized. Gordon (1999; 2002a) argues that it centers on the information system rather than the user, happens in isolated lessons rather than being integrated with subject content, and tends to adopt a step-by-step approach that neglects the complex thinking processes necessary for completing research tasks, with the consequence of facilitating student copy and paste behavior. Johnston and Webber (2003) write that teaching information literacy as a set of skills risks to lead to superficial learning, that is, memorization and reproduction of content, rather than deep learning that involves the development of a personal understanding. Kuhlthau et al. (2007) note that "a transmission approach to teaching emphasizes finding the right answer, memorizing specific facts, and repackaging information" instead of helping students to build their own knowledge from the information they encountered (p.14).

Information literacy teaching according to cognitive and constructivist theories

On a general level, a constructivist teaching approach needs to use strategies both for identifying students' prior knowledge and for enhancing students' mental activity (Wellington, 2008). Gogus (2012) notes that the teacher as a moderator encourages students to be active and act autonomously, nurtures their natural curiosity, invites students to engage in authentic and meaningful learning tasks, provides opportunities for reflection, critical and creative

thinking, higher-order problem-solving, experimenting and learning by doing, as well as transfer of knowledge and its application in concrete situations. In concordance with Vygotski's perception of learning as a social process, constructivist teaching "should be surrounded by an active dialog between the instructor and student while the instructor tries to encourage students to discover principles by themselves" (p. 785) and enhance collaborative learning. Loertscher (2000) notes that teachers who teach based on constructivism allow students to take control of and maintain responsibility for their own learning, consider themselves as guides, emphasize the process of learning rather than the content, use a diversity of teaching sources and tools for addressing the various learning styles and abilities, build authentic learning opportunities together with students, emphasize depth of learning rather than breadth, and allow students to participate in the assessment of their learning both in terms of process and content (pp. 31-32).

Dangers associated with constructivist approaches to teaching are overestimating students' ability of self-directed, independent learning and their motivation as well as a too negative view of the teacher as an observer and controller of student learning (Helmke, 2007). Ausubel (1968) notes that discovery teaching contains the risk to be in discordance with the cognitive developmental stages of students, is particularly suitable only for high-performing students, and is too time-consuming (Ausubel, 1964). He is a strong proponent of expository teaching, that is, the teacher presenting information in verbal format to students; he argues that both expository and discovery teaching can lead to rote as well as meaningful learning. Expository teaching leads to meaningful learning when it adheres to the following principles: making use of advanced organizers, progressive differentiation, sequential presentation of subject content, integrative conciliation, and consolidation (Ausubel, 1968).

Information literacy teaching, according to constructivism, is perceived as a means for helping the student to become "a knowledgeable and knowing person" rather than as an aim in itself, it needs to be addressed in the context of the curriculum and authentic learning tasks not in isolation, it allows students not only to locate information but especially to engage with it actively and creatively so that they can construct new knowledge and develop their own understandings, and it uses strategies such as inquiry teaching where students access information in a broad variety of sources and formats, including information technology, and encounter differing perspectives (Todd, 2002, p. 7). Hanke et al. (2013) provide detailed descriptions and examples of the following teaching strategies, which are meant to help predominantly academic librarians to organize courses about information literacy based on the

principles of constructivist learning: expository teaching, cognitive apprenticeship, Model of Model-Based Instruction, discovery teaching, and problem-based teaching (pp. 11-25). The extent to which the teacher allows students to take control over activities and their own learning depends on the teaching approach chosen: it is higher in problem-based and discovery teaching and lower in expository teaching.

Also in Germany, Gapski and Tekster's (2012b) *Twelve Theses about Information Literacy* are based on a socio-constructivist perspective of learning and teaching. Proponents of a socio-cultural perspective emphasize that information literacy and, as a consequence, information literacy teaching vary depending to the content and context in which they are placed (Limberg, Sundin, & Talja, 2012) and call for a "communicative approach to information literacy education" at academic and school levels (Limberg, Alexandersson, Lantz-Andersson, & Folkesson, 2008, pp. 83; 89). In a meta-synthesis of three of their previous phenomenographic studies, in which altogether 285 students from grades 2 to 12 had participated as well as 24 teachers and 12 librarians, Limberg and her colleagues (2008) concluded that crucial for enhancing student meaningful learning with research assignments are the following strategies: (1) teachers and librarians helping students to formulate good research questions, using strategies for whole-class teaching, group work, and of individual assistance; (2) a focus on learning goals and subject content rather than on technology or the right process, which includes students' participation in the development of learning goals as well as regular feedback on the knowledge parts of the assignment; and (3) as far as critical evaluation of sources is concerned, individual guidance rather than class instruction. They also emphasize that, on the one hand, information literacy education is shaped by the discursive practice about learning, information, and knowledge in the schools, in which it takes place, and which typically centers on knowledge transmission and the provision of correct answers. On the other hand, practices of information literacy teaching that employ research-based approaches to knowledge construction and include critical information seeking and use have the potential to lead to changes in the school discourse.

More aspects of information literacy teaching according to constructivist theories are discussed in the subsection below about teaching with information literacy models (section 2.2.3.2), and especially the implementation of Kuhlthau's ISP.

Table 2-4: Theories of Teaching and IL Teaching

	Behaviorism	**Cognitivism and Constructivism**	**Variation theory**
Teaching	– Uses strategies for reinforcing wanted behavior; – Exerts a high level of control; – Delivers subject content and fosters rote learning; – Assesses student learning of subject content in tests.	– Uses strategies for identifying students' prior experiences and knowledge and for enhancing students' mental activities; – Includes approaches from discovery to expository teaching and the type chosen defines the extent to which the following characteristics occur (with a higher level to be found in discovery teaching and a lower level in expository teaching): • Student taking control and responsibility for his learning; • Teacher acting as guide; • Providing time for (critical) reflection, experimenting, and transfer of knowledge; • Active dialogue between teacher and student as well as student and peers; • Emphasis on process not content; • Focus on depth rather than breadth of learning; • Teacher using strategies of formative and summative evaluation.	– Helps students to gain an understanding of the critical features of a phenomenon; – Begins with an identification of previously developed critical features; – Uses strategies for helping students to experience a phenomenon in powerful ways.
Information literacy teaching	– Centers on the information system; – Teaches IL as a set of skills; – Uses step-by-step approaches; – Happens in isolated lessons, unrelated to subject content.	– Is integrated with subject content; – Helps students to build subject knowledge from a variety of sources; – Emphasizes use of information rather than location; – Needs to be adapted to content and context of discipline and school.	– Is integrated with subject content; – Provides students with opportunities both for discovering variation in IL conceptions and for experiencing variation in their interaction with information.

Information literacy teaching according to variation theory

Orgill (2012) describes teaching for enhancing learning as defined by variation theory. She distinguishes between powerful and less powerful ways of experiencing a phenomenon for

achieving a certain goal and notes that teachers should help students to experience the former. Each phenomenon can only be learned through an understanding of its "critical features"; before addressing a particular phenomenon, educators need to establish, for example, through conversations with individual students or the class as a whole, which critical features students have already developed. It is the teachers' responsibility to define the "object of learning", that is, which conceptions, skills, or capabilities students should develop. Regarding the object of learning, educators need to identify three elements: their expectations about student learning and abilities in terms of the content they present to students, called "the intended object"; the classroom activities they plan for students to experience variation and to become aware of critical features of phenomena, called "the enacted object of learning"; and what students do learn, called the "lived object of learning".

Information literacy teaching should provide students with opportunities to explore variation in different ways: discovering variation in conceptions of information literacy within the whole group through class discussions and times for reflection; experiencing variation themselves not just hearing about it from the teacher; and educators need to raise student awareness about critical aspects (Bruce, Edwards, & Lupton, 2006, p. 12). Teaching about information literacy needs to be combined with subject content, should focus on the internal relations between learner and information and not on the student or the teacher, and requires teachers to adopt the students' perspective and to gain an understanding of their conceptions of the information environment and of information literacy (Bruce, 1997, pp. 60; 170-174).

Together with two colleagues, Bruce (2006) offers a conceptual framework for information literacy teaching that consists, in addition to a "relational frame", of the following five other frames: (1) a discipline-related "content frame", (2) a behavioral or performance-oriented "competency frame", (3) a constructivist "learning to learn frame", (4) a "personal relevance frame" oriented towards experiences, and (5) a "social impact frame" oriented towards social reform". For each of these, the authors describe the underlying perspectives of information and information literacy, the curricular focus, teaching and learning approaches, the content, and make suggestions for assessment. The framework should encourage educators to consider variation in their approaches towards information literacy teaching and be used for designing curricula.

Reasons for using a relational approach to information literacy teaching are that students who develop knowledge and learn procedures about a phenomenon do not necessarily gain a better

understanding of it, that students can experience the same phenomenon in different ways, and that conceptions are crucial for developing competence whereas knowledge and skills play a secondary role (Bruce, 1997, pp. 42–62).

Variety in pedagogical methods or strategies

The central function of *teaching methods*, for which *pedagogical strategies* is a synonym (Crook, 2008), is to initiate, steer, and, if applicable, to control and support learning processes (Helmke, 2007, p. 31). Teachers' choices about them are closely interrelated with the objectives and content of their teaching (Jank & Meyer, 2008, p. 55). On a general level, three major teaching methods are distinguished in the school context: whole-class teaching, small group work, and individualized learning (Crook, 2008; Heath, 2008). Hattie (2009) notes that there are a multitude of teaching methods, for example, explaining, elaborating, modeling, asking questions, demonstrating, teacher-student dialogue, individual assistance on need, direct instruction, reciprocal teaching, inquiry-based teaching, problem-solving teaching, cooperative teaching, or competitive teaching (pp. 200-201).

As reported above, efforts have been undertaken in order to encourage librarians and teachers to consider alternatives to predominantly skills-oriented approaches in information literacy teaching. However, there are authors who see a need to teach information literacy using a variety of approaches, for example, Loertscher (2005) who states:

> Not all learning experiences need to take place in an information-rich environment. It is quite appropriate to rely totally on a teacher's experience or totally on a textbook/lecture format at times, but never as a steady diet. Variety is the spice of education. (p. xxiii)

He is supported by authors in education science. Helmke (2007) posits that given the variety in students' personalities, learning styles, abilities, motivations, behaviors, and achievements, the use of a "mono-teaching culture" would not only be inappropriate but also unfair, and that different learning objectives require different teaching methods. He states that each teacher should be familiar with a variety of teaching methods and be able to apply them in a pedagogically justified, competent, and flexible but not arbitrary way. Teachers should find a sound balance between strategies that foster receptive and discovery learning as well as between those that encourage teacher-directed and independent student learning (pp. 65-70). From his synthesis of over 800 meta-analyses about influences on student learning, Hattie (2009) concluded that "many" teaching strategies have an impact on student learning but crucial is their effective application which takes place when the teacher defines the learning

intentions and success criteria, communicates them to the students, models them, evaluates students' understanding, and integrates it in his formal closure (p. 236). O'Neill (2008) notes that expert teachers have an encompassing repertoire of teaching strategies underpinned by different theories and are able to employ them in concordance with the needs of their teaching contexts and for creating highly effective learning environments. The next subsection discusses the use of models for information literacy teaching.

2.2.3.2 Teaching information literacy with models

Various models were discussed above in section 2.2.1.1 in terms of the definitions of information literacy that they include; this subsection deals with their use for information literacy teaching. On a general level, information literacy models can serve to identify the different parts of a process and design lessons about them; offer a shared terminology for librarians, teachers, and students; assist students in the research process; and monitor teaching and learning (Donham, Bishop, Kuhlthau, & Oberg, 2001, p. 16). They can be employed for defining the content of information literacy teaching, as a basis for collaboration between faculty and librarians (Homann, 2008, p. 82), targeting and coordinating particular information skills (Moore, 2002, p. 2), and as scaffolds to support student meta-cognitive awareness (Wolf, Brush, & Saye, 2003; Moore, 2002, p. 6). Teachers and librarians can make students use information literacy models either as a guide to follow or as a basis for the development of their own model (Herring, 2011, pp. 63–64; Loertscher, 2000, p. 174).

Each author of an information literacy model typically makes more or less detailed suggestions about its use in information literacy teaching, including more or less explicit references to learning and teaching theories. Table 2-5 provides an overview.

Teaching with Kuhlthau's ISP

Kuhlthau states that her ISP gives teachers a way to teach the process of learning from a variety of sources of information (Kuhlthau, 2004, p. 164). It can be used as a metaphor, a description or illustration of the process, a diagnostic tool for teachers and librarians, and as a basis for the user's own reflection about and analysis of his process (Kuhlthau, 2004, p. 138). Based on her ISP and a constructivist approach to teaching, she suggests that teachers make enhanced use of inquiry units, that is, requiring students to engage in an extensive investigation of a question or problem, for which she developed, together with two co-

authors, a concept called *guided inquiry*, that is, a "planned, targeted, supervised intervention throughout the inquiry process" (Kuhlthau, 2010, p. 2). Both types of texts should be part of inquiry units, informational and literary (Kuhlthau, Maniotes, & Caspari, 2007, p. 42). In a more recent publication, intended for librarians and teachers who want to implement the ISP in their schools, Kuhlthau et al. (2012) present a *Guided Inquiry Design Framework* composed of the following eight stages: open, immerse, explore, identify, gather, create, share, and evaluate (p. 30). Each stage of the ISP is represented by one phase in guided inquiry except for presentation, which is extended and represented by two phases, create and share.

An instructional team assists student throughout the process. Ideally, it is composed of a three member core team, including the librarian, a subject teacher, and an additional person, for example, another subject teacher, a reading specialist, or a technology teacher, and extended on need by community members, for example, public librarians or (other) experts (Kuhlthau, Maniotes, & Caspari, 2007, pp. 47–48; Kuhlthau & Maniotes, 2010). The various stages of the inquiry process as well as the concepts related to information literacy should not be addressed in lessons, in which, per definition, student learning tends to be directed by teachers, but in learning- and learner-centered inquiry sessions. Each session should provide students with ample time for entering third space (see section 2.2.3.4) and consist of a starter, worktime, and a phase of reflection (Kuhlthau, Maniotes, & Caspari, 2012, pp. 6–8). The authors also suggest that instructional teams give students opportunities and help them to employ the following six strategies: (1) collaborating with peers, either in larger "inquiry communities" or in smaller "inquiry circles"; (2) conversing, that is, talking for enhancing thinking; (3) composing, that is, writing throughout the process in order to support reflection, for example, in inquiry journals; (4) choosing, that is, taking control of their own learning by making decisions, for example, about the focus of their searches or pertinence, relevance, and quality of information; (5) charting by using concept maps, graphic organizers, and timelines, for organizing and making connections between ideas; and (6) continuing, in the sense of perseverance, that is, showing sustained attention for the project over a longer period of time, which is enhanced when students identify a focus of their interest in the early stages of the process (Kuhlthau, Maniotes, & Caspari, 2012, pp. 37–49).

A crucial aspect in inquiry learning is the individual assistance provided by instructional teams. Based on Vygotsky's *zone of proximal development* she identified a *zone of intervention*, which she defines as "that area in which an information user can do with advice

and assistance what he or she cannot do alone or can do only with difficulty" (Kuhlthau, 2004, p. 129). Intervention that is provided outside this zone is inefficient, unnecessary, and experienced by the user as intrusive or even overwhelming. Her uncertainty principle serves as a basis for interventions: mediators should help learners to move from uncertainty to understanding. She distinguishes between two types of mediators: formal, including librarians and teachers, and informal, for example, parents, friends, and experts (Kuhlthau, 2004). Formal mediators in instructional teams are responsible for providing instruction and guidance for different aspects: the teacher should do it for subject content, the school librarian for information literacy, and the whole team for the information search process, social skills, and literacy competence; ideally, a literacy specialist supports the team (Kuhlthau, Maniotes, & Caspari, 2007, p. 141). Major pedagogical strategies in all phases of the ISP encompass modeling, listening, and encouraging (Kuhlthau, Maniotes, & Caspari, 2012). As far as assessment of student learning is concerned, mediators use both strategies of summative assessment during the process and strategies of formative evaluation at the end of the unit (Kuhlthau, Maniotes, & Caspari, 2007, p. 111). Heinström's (2006) findings about students' differing approaches to information seeking, she identified fast surfers, broad scanners, and deep divers, have implications for instruction and guidance: different students may need different types of interventions or none at all, and the same student may need different types of interventions in a particular context (Heinström, 2006).

Teaching with Eisenberg and Berkowitz' Big6

The Big6 model, which according to their authors can be used with all types of information-based problems that may occur inside schools, including research projects but also any type of homework, tests or quizzes, and outside school (Eisenberg & Berkowitz, 2000, p. 14), can serve as a guide providing the user with some orientation or reference point, as a safety net when users get lost, and enhance meta-cognition (Eisenberg, 2008, pp. 41; 43). For instructors it provides "a definitive set of skills" that students should develop, and about which they should teach their students in modules or lessons, preferably integrated with subject content (Eisenberg, 2008, p. 41). They refer explicitly to computer literacy, about which they emphasize that it should be integrated with subject content and each stage of the Big6 (Eisenberg & Berkowitz, 2000, pp. 29–30).

For each of the six stages they make suggestions about pedagogical strategies, for example, offering examples of the task but limiting directions about the assignment in phase one; using

brainstorming activities in phase two; doing explicit teaching or showing examples in phase three; giving lessons or exercises, and especially raising student awareness about where exactly in the process the required actions are needed in phase four; seeking help, for example, from librarians, technology specialists, or expert students in phase five; and giving clear assessment criteria, offering enough time for reflections, making themselves readily available for students, requiring a student to keep a log, and discussing with students regarding the aspects in phase six (Eisenberg & Berkowitz, 2000).

Repetition being crucial for student learning, teachers should provide opportunities not only for the development but also for the application of the Big6 skills. Teachers should also address isolated Big6 skills as it is neither necessary nor desirable to teach the whole process with each single curriculum unit (Eisenberg & Berkowitz, 2000, pp. 43; 44). Because standardized tests are applied a lot in education, Eisenberg and Berkowitz suggest linking the Big6 to student test preparation; they do not consider it as "teaching to the test" but as addressing the skills that help students to successfully complete the tasks included in standardized tests (Eisenberg & Berkowitz, 2011, p. 128).

Teaching with Herring's PLUS model

Unlike the ISP, which he perceives as useful especially to teachers and librarians, and similar to the Big6, Herring perceives of his PLUS model as an "integrated framework" for teachers, librarians, and students (Herring, 2011, p. 63). He states that his model can only be used within a learning environment based on social constructivism (Herring, 2011, p. 6) and consequently can be changed according to the needs of each school (Herring, 1996, p. xiii).

Teaching with Dannenberg's LIK

Dannenberg's model is just one part of a whole program that he developed for use in all types of libraries under the name of *Information Literacy Learning System* and that includes, in addition: (1) a list of learning objectives for each side of his tetrahedral information literacy model, (2) a model for cooperation between libraries and all types of schools and educational institutions, (3) descriptions of the three major underlying pedagogical principles, which are participant orientation, focus on themes rather than tools, and use of activating methods, and (4) the six components that should underlie each information literacy session. The six components include (1) the use of working sheets, (2) group work with mutual presentations, (3) model searches, model oral presentations, and model assessment, (4) a buddy system and

tutors, (5) individual research exercises and/or oral presentations, and (6) some type of performance record (Dannenberg, 2002, pp. 314–315; Dannenberg, 2012a). Homann (2003) observed that Dannenberg's work has been particularly important for the introduction of constructivist, learner-centered, creative, research-oriented approaches to information literacy teaching in German libraries (p. 314).

Table 2-5: Teaching with IL models

	Kuhlthau ISP	**Eisenberg & Berkowitz Big6**	**Herring PLUS model**	**Dannenberg LIK model**	**Homann DYMIK**	**SCONUL 7 Pillars**	**Bruce 7 Faces**
Related learning theories	Construc-tivism	Meant to fit each	Social construc-tivism	Construc-tivism	Construc-tivism	Construc-tivism	Variation theory
Teaching program	*Guided inquiry* - includes: creation of third space; Instructional team; Inquiry sessions (not lessons); Individual assistance in zones of intervention	Integration with IT and subject content; Based on real (student) needs; Pedagogical strategies for each of the 6 skills; Teaching whole process or isolated skills; Can be used for preparation to standardized tests	Integration with subject content; Model is flexibly adaptable to every school context	*IL Learning System* - includes: Ideally integration with subject content but also isolated units; List of learning objectives; Library and school cooperation model; Pedagogical principles and components (e.g., focus on user who needs to be actively involved)	Integration with subject content; Problem-oriented; Using activating methods	Model is flexibly adaptable by individuals and teachers	Providing opportunities for experiencing IL in various ways
Use of model in teaching	Metaphor; Description; Diagnostic tool for teachers and librarians; Basis for the user's self-evaluation	Guide; Reference point; Basis for meta-cognition; Set of target skills for teachers and librarians	For students, teachers, and librarians	For students, teachers, and librarians	Tool for structuring programs and courses (for librarians and teachers); Cognitive map (for users)	Map; Description	For explaining/ understanding IL; For curriculum design and evaluating IL programs (teachers and librarians)

Teaching with Homann's DYMIK

Homann developed his DYMIK model with the aim of helping to transform the predominant "pragmatic" and "object-oriented" user education in German academic libraries into user-

centered approaches, in which "contents ... are related to learning targets in a functional way" (Homann, 2000a, p. 195; Homann, 2003, p. 312). He understands his encompassing model as a tool for structuring whole programs and individual courses, as a "didactical and methodological instrument" that facilitates the integration of library teaching with subject content, and helps to perceive and reflect on the information process as an object of teaching. It should be employed together with problem-oriented and activating teaching methods. The model helps to communicate the content of information literacy. The graphic, which is a simplified representation of complex information processes, is of "fundamental importance" because it facilitates the learning process in the sense that it provides a cognitive map for the development of additional competencies and enhances the awareness about the affective dimensions of individual information processes (Homann, 2003; Homann, 2000a).

Teaching with SCONUL's Seven Pillars

A particularity of the SCONUL model, which was also developed for use in higher education, is the presentation of different versions. The core model is supplemented with several "lenses", for example, a "research lens" and "a digital literacy lens", which are expanded or simplified models for specific groups of learners. The authors also emphasize that the model can be adapted flexibly by individuals and teachers to meet personal circumstances (SCONUL Working Group on Information Literacy, 2011, p. 3).

Teaching with Bruce's Model of the Seven Faces

Bruce writes about her model *The Seven Faces of Information Literacy*, which she developed in a phenomenographic study, that it can be employed in a lecture type of teaching for presenting information about the conceptions included in information literacy or in small group discussions for raising student awareness about alternative conceptions or for encouraging their reflection. But she strongly suggests using it together with a relational approach to teaching, according to which teachers would provide opportunities for students to experience information literacy in all seven ways suggested by the model (Bruce, 1997, pp. 170–171) and to expand their conceptions. In her study, she found that several participants highly valued seeking help from peers or information professionals; from there she concluded that information literacy education should beware of overemphasizing individual autonomy (Bruce, 1998, p. 41). Her model can also be used for the redesign of information literacy curricula so that they will be based on conceptions rather than attributes, but she emphasizes that learning objectives should be described based on the details she provides about each

category. Her model can also be used in order to make sure that all the different aspects are covered and to begin teaching information literacy according to the relational approach (Bruce, 1997, pp. 169–170). Catts (2005) finds that Bruce's model is useful as a framework for understanding as well as developing and teaching information literacy (p. 19). Moore (2006) used the model as a framework for evaluating the integration of information literacy and lifelong learning in the New Zealand education sector, that is, in national policies, teacher education, and curricula.

Models can be useful and help students to complete research assignments successfully (Herring, Tarter, & Naylor, 2002; Herring, 2006; Probert, 2008; Wolf, Brush, & Saye, 2003) and lead to important learning (Kuhlthau, 2004; Kuhlthau, Heinström, & Todd, 2008). However, although the majority of the authors emphasize that their models should not be perceived as a linear description of the information process or a list of skills, there is a major risk that they are used as such. Markless and Streatfiled (2009) find that most of the authors of these models provide "little help ... on how to use the model in a non-sequential way, with the result that the framework tends to be taught as a sequence" (p. 323). Still, the authors have developed more or less comprehensive and detailed material about the implementation of their models that they spread through various channels. For example, Eisenberg and Berkowitz provide supporting material in print form (Eisenberg & Berkowitz, 2000; Eisenberg & Berkowitz, 2011), on their website (Eisenberg & Berkowitz, n.d.), and through an important number of workshops in countries throughout the world (Markless & Streatfield, 2009). Kuhlthau, whose emphasis has been on the empirical foundation of her model, has long offered workshops, supported by the Center for International Scholarship in School Libraries in New Jersey of which she is a co-founder, and more recently also published together with two other authors three books about the implementation of the ISP and guided inquiry in the context of constructivist approaches to learning (Kuhlthau, Maniotes, & Caspari, 2007; Kuhlthau & Maniotes, 2010; Kuhlthau, Maniotes, & Caspari, 2012). Writing about Bruce's model, Herring (2010) observed that there is no guide for helping others to implement it (p. 72). Dannenberg, for example, has developed model lessons and trainings (Dannenberg, 2004), also heavily relies on his website (Dannenberg, 2012b), and offers workshops, speeches, coaching, and professional development in German-speaking countries. Literature about the use of standards in information literacy teaching is discussed in the next subsection.

2.2.3.3 Teaching information literacy with standards

Information literacy standards are per definition destined to be used in teaching and can serve various purposes. Discussing standards for public libraries on a general level, Umlauf (2005c) noted that they could help to enhance rationalization, economic efficiency, quality assurance, order and precision, and costumer orientation (p. 8). The education systems in Germany and the USA rely heavily on standards. Mandatory educational standards describe the minimum competencies which students should have developed at a particular grade level in such a way that they can be assessed in tests, they serve as a basis for the development of curricula on state and school level, and they help to ensure and enhance quality and can be used as part of the evaluation of schools and school systems (*Bundesministerium für Bildung und Forschung*, 2009).

Writing about the development of standards for media literacy education, Tulodziecki (2012) identifies risks and positive effects. The five risks include (1) an overemphasis of goal orientation at the expense of process orientation and student participation; (2) a focus on measurable aspects at the expense of aspects that are more difficult to observe such as making use of media in an appropriate, self-determined, creative, socially responsible way; (3) neglecting individuality in the process of developing competencies as they expect all students to reach particular levels at particular points in time; (4) disregarding future developments, for example, in technologies; and (5) standards tend to be formulated by experts without the active participation of their users. The positive effects are that standards can contribute to a higher degree of transparency in terms of expectations in media education, facilitate collaboration of the various groups involved, strengthen the position of media education in the discussion about its role in education, and help to enhance the further development of the field of media education (pp. 81-82).

Discussing various information literacy standards, Homann (2008) explains that they can serve as a basis for the development of library-related lessons that are more or less integrated with subject content, they help to coordinate activities and to ensure a "specific shared quality" (p. 92). He considers standards as being part of a process because they need to be adapted to the various types of users and to changes in requirements. Standards can be used to structure and coordinate interdisciplinary training modules about information literacy and, as such, enhance both the willingness to collaborate and the understanding of a pedagogy based on the principles of participant activity and problem-orientation. He reported about

information literacy standards being regarded by representatives of subject disciplines in higher education as a proof of the librarians' pedagogical competence, which lead to an increased demand for information literacy training sessions and a stronger integration with undergraduate courses. He perceives of standards as complementing models, the second playing a role especially on the conceptual and the first on the pedagogical level.

Standards can be more or less formal; they can be mandatory, recommended, suggested, voluntary, or de facto (Eisenberg & Berkowitz, 2011, p. 124; Ravitch, 1995, p. 14). Standards of information literacy can become mandatory, for example, when they are included in official documents with subject area standards. When presented in separate documents, they achieve varying levels of formality and recognition; the ACRL *Information Literacy Competency Standards for Higher Education*, for example, have been perceived "by practitioners as a mantra for effective information literacy instruction" (Kerr, 2010, pp. 41–42).

Information literacy standards are typically accompanied by more or less encompassing supporting material in order to enhance their implementation. For the *Standards for the 21st-Century Learner* (American Association of School Librarians, 2007) these include, on a general, library level *Empowering learners: Guidelines for school library media programs* (American Association of School Librarians AASL, 2009a), a revised version of *Information Power: Building partnerships for learning* based on the 21st-century standards. In Germany, Umlauf emphasized in (2005c) that standards of information literacy need to be complemented by standards of information literacy teaching, which define the organizational and spatial prerequisites for successful application of information literacy standards (pp. 26-28). In 2009, the Bavarian Information Literacy Working Group published a checklist for information literacy courses, organized around the following seven topics: appropriate rooms, integration into BA and MA programs, types and frequency of courses, staffing and legal requirements within the institution, type of performance record for participants, and organization (*AG Informationskompetenz im Bibliotheksverbund Bayern*, 2009). In the USA, AASL released a plan for the implementation of the aforementioned standards and guidelines at the national level (American Association of School Librarians, 2008). In addition, for the local, school level, AASL provides a guide that includes examples and suggestions for the incorporation of the standards into the school library program and into teaching at the different grade levels (American Association of School Librarians, 2009b), an overview with intersections between the AASL and subject standards (American Association of School Librarians, n.d.a), a *Lesson Plan Database* (American Association of School Librarians,

n.d.c), and a *Lesson Plan Rubric* (American Association of School Librarians, n.d.b). The new AASL standards promote inquiry learning and teaching based on constructivism even more than former versions; the encompassing supporting material seeks to encounter the risk that librarians and teachers use what Johnston and Webber (2003) call with regard to the application of the ACRL standards a "tick the box approach" (p. 337), that is, reducing information teaching to a mere skills approach in concordance with behaviorist principles. The next subsection discusses literature about teachers' assignment of research tasks.

2.2.3.4 Assigning research tasks

The majority of information literacy definitions, models, and standards begin with the identification, recognition, or simply description of an information need. Case (2012) defines an information need as "a recognition that your knowledge is inadequate to satisfy a goal that you have" (p. 5). From observation about the origins of user queries in public and school libraries, Gross (2005) distinguishes between self-generated and imposed questions. In the school context, teachers may create information needs or impose questions through the assignment of more or less encompassing and more or less formal research tasks; typical examples of the latter are research papers or projects. Important aspects of assignments are the type of task, strategies for arousing and sustaining student motivation, and approaches towards assessment; important literature about them is discussed in this subsection.

Research papers, *research projects*

Research papers, research projects, or other types of research assigned by teachers are typical situations when students engage in information seeking processes, for example, in the school library. They have a long tradition in US schools (Kuhlthau, Maniotes, & Caspari, 2007, p. 3), especially in language arts, social studies, and to a lesser extent in science and the fine arts, but there has been a decline since the *No Child Left Behind* law was passed in 2002, as a consequence of which "many teachers have abandoned a regular research unit in favor of covering content mandated by state standards" (Loertscher, 2008, p. 42). If teachers assign research tasks, they often intend to enhance student motivation by adding variety to class activities (Williams & Wavell, 2006a, p. 30). Student learning through research assignments has been a frequent topic in LIS studies (Gordon, 1999; Herring, 2006; Kuhlthau, 1989).

Types and content of tasks

Research assignments typically include a task set by the teacher and/or librarian. A task can include "a description of a goal, a purpose, implementation methods, requirements and a meaningful outcome"; it can invite an individual to go through a particular sequence of actions, which encompass physical, affective, and cognitive dimensions; complex tasks may include subtasks (Tanni & Sormunen, 2008, p. 896). The task is crucial for students' learning experience (Todd, 1999a, p. 9), for example, its level of complexity, the type of questions asked, and not only students' understanding and perceptions of the task but also a shared understanding regarding the task of students and teachers and/or librarians (Williams & Wavell, 2006b, p. 10). Also, teachers need to make sure that the task set coincides with the expected outcomes (Williams & Wavell, 2006a, p. 45) and that students already have or understand the skills needed to complete the task (Williams & Wavell, 2001a, p. 62). Small (1998) emphasizes the importance of tasks that not only help students to develop knowledge and skills but also enhance their motivation. Learning tasks vary in their level of difficulty; they can have the form of simple exercises, such as the application of a formula in math, essay writing, or complex projects (Tanni & Sormunen, 2008, p. 895).

The type of learning tasks assigned is closely related to the underlying learning theory. Teachers using behaviorist strategies seek to control a research unit as much as possible and tend to assign "bird units", which require the collection of facts presented in some kind of report and which support a copy and paste behavior, whereas teachers using constructivist approaches assign tasks that require students to think about and do something with the gathered information so that they develop new knowledge (Loertscher, Koechlin, & Zwaan, 2005). Tanni and Sormunen (2008) note that school assignments tend to be product-oriented rather than process-oriented and to require students to follow a script in mechanical ways and to locate and present facts (p. 901); based on the research of various authors they describe the characteristics of cognitively demanding learning tasks:

> The point of departure of a demanding learning task is a specified problem or scenario, which is sufficiently open-ended to allow a variety of responses or solutions. Learners need to provide the solutions relatively autonomously over extended periods of time, perhaps in collaboration with others. Teachers assign the task, facilitate the process and offer assistance, but learners pursue their own lines of investigation. Note taking, writing and organization of information are important parts of the learning task. Learners need to learn how to identify what information is important to them, construct new meanings, and explain their new understandings to others as documents, presentations or artifacts in a way that is authentic to the topic. (p. 895)

Shenton and Fitzgibbons (2010) find that the LIS literature in general takes a too narrow, simplistic view of situations that drive students towards information seeking, distinguishing predominantly only between two: seeking for information in the context of academic work or out of personal interest. As far as the assignment of research tasks in the school context is concerned, they suggest the adoption of a broad, real-life perspective as described, for example, in Dervin's typology that distinguishes between "decisions ..., problems ..., worries ..., and comprehendings [*sic*]" as situations that require information seeking (p. 169). Kuhlthau et al. (2007) deplore that too frequently research assignments are extraneous, artificial add-ons after the requirements of the subject curriculum have been met (p. 3) and suggest the creation of *third space*. Teachers should assign "as often as possible" learning tasks that require students to combine their own, personal world, that is, their out-of-school knowledge and experience developed in the context of their family, community, peers, and popular culture (*first space*) and the curriculum, which includes both the formal, official curriculum as well as "school ways of knowing" (*second space*) in a new, third space, so that meaningful and long lasting learning can occur (pp. 31–36).

Stimulation and sustainment of student motivation

Motivation is one of the crucial prerequisites for learning, and closely related to emotion and cognition (Gudjons, 2006, p. 225). It includes components such as a "sense of control, success, satisfaction, and the importance of the activity to the learner" and has an important impact on how a student receives and engages in a learning task (Tanni & Sormunen, 2008, p. 899). Small (1998) explains that Keller combined major theories and concepts of motivation into a Model of Motivational Design; it that states that teachers can enhance student motivation by using strategies in four areas, abbreviated ARCS: (1) attention, that is, strategies for sparking and maintaining student curiosity and interest; (2) relevance, strategies for linking teaching to needs, interests, and motives that are of great importance; (3) confidence, that is, assisting learners in developing the expectation that they will successfully complete the learning task at hand; and (4) satisfaction, that is, using intrinsic and extrinsic reinforcement (Small, 1998). Helmke (2007) disagrees with the qualification of intrinsic motivation as good and extrinsic motivation as bad and emphasizes that given the variety of motivational systems needed for maintaining learning in the school context, teachers need to make use of a variety of motivational techniques and strategies (Helmke, 2007, p. 75). Another model, Wlodkowski's *Time Continuum Model*, describes six elements that have an impact on motivation, including attitudes, needs, stimulation, affect, competence,

reinforcement, and the strategies teachers should use at three points of any teaching episode, that is, at the beginning, during, and at the ending, for sustaining student motivation (Small, 1998).

As far as student motivation for engaging in research assignments is concerned, Kuhlthau found in her studies about the information search process different levels of interest. It increased with the formulation of a focus: as learners constructed new knowledge, motivation and intellectual engagement became stronger, and, in parallel to the decrease of uncertainty, personal interest grew (Kuhlthau, 2004, pp. 101–104). From her extensive research with students who were undertaking guided inquiry projects, where she observed that students with a low level or mere extrinsic motivation used a fact-finding surface approach, whereas students with a high motivation or intrinsic motivation employed a deep approach and built important new knowledge, Heinström (2006) concluded that students need engaging topics. Student motivation can be fostered when teachers and/or librarians adhere to the following principles when assigning research tasks: (1) suggest tasks that are meaningful to the student and arouse his curiosity and interest; (2) allow the student to choose a topic of his interest, and for which he has already developed some prior knowledge; (3) present the task in a way that the student feels he is likely to complete it successfully; (4) allow different levels of success; (5) make sure that the student understands the assignment, the process, and the outcome; (6) let the student decide on the presentation; (7) provide regular feedback during the process, not only at the end; (8) make sure that students have some prior knowledge about the information system, the information technology, and the information process they are expected to use; and (9) allow students to employ different information seeking styles (Shenton & Fitzgibbons, 2010; Small, 1998; Smith & Hepworth, 2007).

Assessment of research tasks

Clearly defined learning objectives and achievement criteria, which are communicated to students, are integral parts of successful teaching (Hattie, 2009, p. 236), and of research assignments (Eisenberg & Berkowitz, 2000, p. 59; Herring, 1996, p. 50; Kuhlthau, Maniotes, & Caspari, 2007, p. 112). Assessment in the context of research assignments needs to take into account all types of learning involved, for example, subject content, information literacy, information technology (Eisenberg & Berkowitz, 2000, p. 57; Herring, 1996, pp. 50–51), learning how to learn, literacy competence, and social skills (Kuhlthau, Maniotes, & Caspari, 2007, pp. 112–113). It should be both formative, that is, happen throughout the process so that

it provides indications for interventions to be offered by the instructional team and allows students to adjust and improve their work, and summative, that is, take place at the end for establishing student learning after completion of the entire unit (Eisenberg & Berkowitz, 2000, p. 57; Herring, 1996, p. 50; Kuhlthau, Maniotes, & Caspari, 2007, p. 111). Student learning in research assignments should be assessed by the teacher together with the librarian and other educators or experts who are involved as well as the learner himself (Eisenberg & Berkowitz, 2000, pp. 57–58; Kuhlthau, Maniotes, & Caspari, 2007, pp. 112; 125-126). Assessment can take place for individual research units, for several research units within a school year, or over several years so that it offers cumulative evidence about changes in learning and abilities of individual students; longitudinal assessment should be provided by the librarian in the first place (Kuhlthau, Maniotes, & Caspari, 2007, p. 125). The outcomes of assessments are not only destined to students and teachers but also to parents (Eisenberg & Berkowitz, 2000, pp. 57–58). Strategies for assessing student information literacy learning in the context of research tasks include portfolios, learning and research logs, rubrics (Eisenberg, Lowe, & Spitzer, 2004, pp. 101–106; 233), observation, indicators of student performance as displayed in journals or other short written records, conferences with students, a survey administered at different points of the process, as well as final products and tests (Kuhlthau, Maniotes, & Caspari, 2007, pp. 111–131).

This section began with a discussion of important texts about behaviorist, constructivist, and relational teaching theories, followed by those about the use of models and standards in information literacy teaching, and finally those about the assignment of research tasks. The next section deals with key texts about the collaboration of school librarians in information literacy teaching.

2.2.4 Collaboration of School Librarians (SL) and Teachers

This section reviews key literature about the collaboration of school librarians and teachers for information literacy teaching. Texts about the integration of information literacy teaching with subject content are discussed in the first subsection, whereas the next two subsections deal with the roles of the school librarian and the teacher, respectively, in collaborative information literacy teaching. All these issues are addressed here from a LIS view and are considered from the teachers' perspective in sections 2.3.3 and 2.3.4.

2.2.4.1 Integrated information literacy teaching

Pitts (1995) found in an oft-cited study that she undertook at the beginning of the 1990s about students completing a research assignment that they "always used their information-seeking-and-use knowledge in conjunction with a subject matter" and from there she concluded that in complex resource-based learning units at least one subject-matter strand in addition to several process-related strands needs to be included. Since then, various types of quantitative and qualitative studies have shown that information literacy teaching integrated with subject content has a positive impact on student learning (Achterman, 2008; Chu, Chow, Tse, & Kuhlthau, 2008; Lamb & Todd, 1994; Lance, Rodney, & Hamilton-Pennell, 2000b; Lance & Schwarz, 2012; U.S. National Commission on Libraries and Information Science, 2008; Smith, 2006c; Todd, 1995; Todd & Kuhlthau, 2004; Todd & Kuhlthau, 2005a; Todd, Kuhlthau, Heinström, & Bird, 2005; Todd & Heinström, 2006b; Todd & Heinström, 2006a; Todd, Gordon, & Lu, 2011; Todd, 2012).

As a consequence, various authors of information literacy models emphasize, although to varying degrees, that they should be employed in the context of subject curricula. For the implementation of the ISP, Kuhlthau et al. (2007) developed the concept of third space, which was explained in more detail above in section 2.2.3.4, and that invites librarians and teachers to create opportunities for bringing together students' out-of-school experiences and subject curricula (pp. 31-36). Eisenberg and Berkowitz and their colleagues note that "the Big6 Skills are best learned when integrated with classroom curriculum and activities" (Eisenberg & Berkowitz, 2000, p. 10), and that the Big6 can be used as a tool for identifying and combining the information skills contained in subject-related standards and those described in separate documents with information literacy standards (Eisenberg & Berkowitz, 2011, p. 124). Herring, emphasizing the importance of student transfer of skills and abilities, argues that information literacy should be taught not only in isolated subjects but across the whole curriculum (Herring, 1996, p. 31; Herring, 2011, pp. 70–72).

In Germany, the basis of Dannenberg's LIK is the idea that the various types of libraries and educational institutions collaborate with the aim of enhancing information literacy for lifelong learning. As far as schools are concerned, he describes the collaboration of the (public or school) librarian with a teacher for fostering student information literacy that is anchored in the subject curriculum as the ideal situation and encourages librarians to proactively seek out teachers who agree to participate. But he also provides examples of isolated situations of

information literacy teaching in libraries for which he suggests relying upon the principles of user orientation, focusing on topics rather than tools, and the use of activating methods (Dannenberg, 2000; Dannenberg, 2002; Dannenberg & Haase, 2008). The primary goal of Homann's DYMIK is the improvement of the modular training sessions offered by academic libraries; it has a strong library focus, but he sees it as a tool for structuring information literacy units and, as a consequence, for facilitating and coordinating their integration with discipline curricula (Homann, 2000b; Homann, 2000a, Homann, 2003, pp. 313–314).

A major contribution was made by Montiel-Overall, who, based on the literature in education as well as information and library science and her own research, has developed and refined a theory of teacher-librarian collaboration; it is described in more detail in the research part of this chapter (section 2.3.3). She distinguishes four facets: coordination, cooperation, integrated instruction, and integrated curriculum, and found that the impact on student learning is highest with the latter according to which integrated information literacy teaching happens in all subjects (Montiel-Overall, 2005b; Montiel-Overall, 2005a; Montiel-Overall, 2008). Among the first to promote a whole school approach to information literacy teaching in the middle of the 1990s were Henri with his concept of *The Information Literate School Community* (Henri, Boyd, & Eyre, 2002) and Todd. The latter, together with several colleagues, noted, based on research at an Australian secondary school, that changing conventional instruction into integrated information literacy instruction within a whole school should not be imposed on teachers in one way or another but developed together with the faculty (Lamb & Todd, 1994; Todd, McNicholas, & Sivanesarajah, 1991).

Also developed in Australia by the two teacher-librarians Ryan and Capra, but distributed by ALA in North America, was the award-winning *Information Literacy Planning Overview* that offered a concept and materials for integrated information literacy across the curriculum (Ryan & Capra, 2001a; Ryan & Capra, 2001b). The *Guidelines on Information Literacy for Lifelong Learning* developed by the Information Literacy Section of the International Federation of Library Associations and Institutions (IFLA) states that "the complete success of an information literacy program depends on the commitment at the institutional level" and proposes several actions to take and strategies for encouraging changes (Lau, 2006).

In Germany, Umlauf (2005c) developed standards for the collaboration of (public or school) libraries with schools, which should be considered as criteria or organizational and spatial prerequisites for successful information literacy teaching. They state that all teachers across

the curriculum should (1) be informed about the library program and what it has to offer, (2) participate in professional development about the integration of the library into their teaching, (3) use independent learning activities when making use of the library and act as moderators, and (4) be supported in their collaborative endeavors by their colleagues and especially by the principal (pp. 26–27). Ballod (2005) also suggests integrating information literacy across courses (p. 44), whereas Gust von Loh and Stock (2013) see the need to create a separate comprehensive course that helps students to develop and practice information literacy qualifications, an approach highly questioned by Schlamp (2013) who argues that methods cannot be learned separated from (subject) content (p. 59).

In the next two subsections literature about the roles of the school librarian and the teacher, respectively, in collaborative information literacy teaching are discussed.

2.2.4.2 The role of the school librarian

Both the practice-oriented as well as the scientific literature in the field of libraries and information discusses several roles of the school librarian. Those relevant for collaborative information literacy teaching and only the most important ones are briefly discussed here; they include the librarian being a resource for students and teachers, planning with teachers, acting as a teacher, and a being a leader of collaboration.

The school librarian as resource

One of the traditional roles of the school librarian is that of a resource. He is supposed to provide "intellectual and physical access to materials in all formats" (American Association of School Librarians and Association for Educational Communications and Technology, 1998b), not only to students but also to teachers and the entire school (Williams & Coles, 2007, p. 832). In guided inquiry units, librarians "provide the laboratory for developing information literacy", which includes a collection of well-organized materials within the school, internet resources, community resources in public libraries or museums, and contacts to subject experts (Kuhlthau, Maniotes, & Caspari, 2007, p. 49). Numerous studies have found this role to have an impact on student achievement (Achterman, 2008; Lance, Rodney, & Hamilton-Pennell, 2000a; Lance, Rodney, & Russell, 2007; Lance, Rodney, & Schwarz, 2010; Smith, 2006b; Todd & Kuhlthau, 2004; Todd & Heinström, 2006a; Todd, Gordon, & Lu, 2011).

The school librarian planning with teachers

Another area of activities that school librarians have been requested to engage in is that of designing lessons together with teachers (American Association of School Librarians and Association for Educational Communications and Technology, 1998b). Collaborative school librarian-teacher planning has also been found to contribute in positive ways to student achievement (Lance, Rodney, & Hamilton-Pennell, 2000a; Lance, Hamilton-Pennell, Rodney, Petersen, & Sitter, 2000; Lance, Rodney, & Russell, 2007; Lance & Schwarz, 2012; Smith, 2006b; Todd, Gordon, & Lu, 2011). Based on learning theories, Loertscher (1999) distinguishes between a traditional and a constructivist method of collaborative planning (pp. 10–11). Wolcott (1994) emphasizes that "a successful instructional partnership hinges on the library media specialist's understanding of the planning process as teachers see and practice it".

The school librarian as teacher

School librarians are expected to act as teachers (American Association of School Librarians and Association for Educational Communications and Technology, 1998b). Montiel-Overall (2005b) noted that librarians need good teaching skills and preferably a teaching certificate in addition to a master's degree in library science for participating in collaboration. Authors of information literacy models describe the role of the librarian as a teacher in various ways. Kuhlthau et al. (2007) see him as the teacher for information literacy who selects the information literacy standards that will be addressed, "teaches concepts of information access, evaluation, and use; maintains long-term relationships with students from year to year; [and] fosters [a] constructivist learning environment". He does not teach information literacy ahead of time but provides interventions when they are needed, that is, "'point of use' instruction" in the zones of intervention; he does this also for aspects related to the learning process or the ISP, literacy skills, and social interaction, but not for subject content. He should be responsible for longitudinal assessment (pp. 49, 57; 125; 141-412). The authors of the Big6 note that the librarian "can" teach lessons about the stages or specific aspects of them "at the relevant time" and participate in assessment, be it formative, summative, or both (Eisenberg & Berkowitz, 2000, pp. 10; 41; 57). For Herring, the librarian is the specialist of research skills who should participate in teaching, providing individual guidance, and grading (Herring, 1996, pp. 31; 85-164; Herring, Tarter, & Naylor, 2002, p. 5). In Germany, Dannenberg (2012b) notes that the (public or school) librarian should not only be involved in

the planning phase but also in the actual teaching, in student assessment, and in the evaluation of the collaborative unit (pp. 191-192).

Again, empirical research has found important positive implications for student learning when librarians act as teachers (Achterman, 2008; Lance, Rodney, & Hamilton-Pennell, 2000a; Lance, Rodney, & Hamilton-Pennell, 2000b; Lance & Schwarz, 2012; Todd, 2012). As the result of an encompassing mixed method study in 39 effective school libraries in Ohio, in which over 13,000 students and almost 880 faculty members participated, Todd and his colleagues (2005a) developed the *Model of the School Library as a Dynamic Agent of Learning*, according to which an effective school library is informational, transformational, and formational. The informational part, in the sense of providing access to information resources that differ in formats and content for students who are completing research assignments was found to play a crucial role, but these highly effective librarians went beyond and took an active role in student learning:

> [They were found to help] students develop the appropriate cognitive, behavioral, and affective scaffolds to enable them to engage meaningfully with information, to make decisions about the information they encounter in terms of its worth and appropriateness, and to restructure pertinent information into appropriate representations of their newly acquired understandings. (p. 85)

The school librarian as leader

As far as leadership on a general level is concerned, Lance reports that he and his colleagues have not found a direct correlation with student achievement. They have found an indirect correlation in the sense that school librarians who spend more time on leadership activities also spend more time on collaboration, and so he argues that school librarians willing to collaborate should "establish [themselves] as a leader that somebody would want to collaborate with" (Achterman, 2007). As far as librarians' leadership role in the context of information literacy is concerned, Williams and Wavell (2006a) note that school librarians "are in the unique position of being in a cross-curricular position to co-ordinate information literacy activities, not only those taking place in the library but ensuring consolidation is maintained in the classroom" (p. 61). Kuhlthau et al. (2007) see school librarians as "vital agents", the leaders of the instructional teams, and "collaboration gatekeepers" who are responsible for coordinating the teams, ensure open ways of communication, are flexible managers, and communicate with the community inside and outside school (pp. 49; 57-58).

As far as the Big 6 are concerned, school librarians are supposed to behave as coordinators of school-wide implementation because "they are responsible for providing resources and services to all grades and subjects and generally have an excellent overview of the existing school curriculum" (Eisenberg & Berkowitz, 2000, p. 52). The next subsection discusses key literature about the role of the teacher in information literacy teaching.

2.2.4.3 The role of the teacher

This section describes the role of the teacher in collaborative information literacy teaching with the librarian from the LIS perspective. Research about teachers' conceptions and practices from their own perspective are discussed in a separate section (*2.3.3*). Teachers are seen as facilitators of information literacy teaching, subject experts, and information literacy teachers.

The teacher as facilitator of IL teaching

Teachers have an influence on student use of the school library (Williams, Grimble, & Irwin, 2004). Henri (2001) reported that "a consistent thread throughout the literature is that information literacy must be a priority with teachers if it is to be a reality for students" (pp. 120–121). The teacher is the one who provides opportunities for integrating information literacy learning with subject content. Kuhlthau (2010) notes: "the teacher's main challenge is to create third space as often as possible" (p. 5). Eisenberg and Berkowitz (2000) write that the Big6 should be part of everyday classroom activities and, in addition, implementation plans should be made by individual teachers or by teams of teachers for specific subject areas or grades. Regardless the approach, individual or team, teachers are responsible for identifying good opportunities for Big6 learning and teaching in the curriculum, determining the information literacy and information technology skills which will be addressed, and developing a formal plan, that is, a *Big6 Skills Unit Matrix*, at the beginning of the school year (pp. 10; 39–53).

The teacher as the subject expert

Typically the teacher is perceived as the subject specialist as opposed to the school librarian who is the information or information literacy specialist (Herring, 1996, p. 31; Kuhlthau, Maniotes, & Caspari, 2007, pp. 49; 56). For example, in guided inquiry units instructional teams include one or more subject teachers in addition to the librarian and other specialists;

the teacher defines for his subject what content will be covered, formulates the curricular objectives, selects the subject-related standards, provides interventions for subject content, and, together with the other team members, provides interventions for the learning process or the ISP, literacy skills, and social interaction (Kuhlthau, Maniotes, & Caspari, 2007, pp. 56; 141). More controversial is the role of the teacher as an information literacy teacher.

The teacher as information literacy teacher

Students also like to learn about information literacy from teachers (Latham & Gross, 2008). Authors of information literacy models have different understandings of the role of the teacher in information literacy teaching. The authors of guided inquiry distinguish between information literacy and the ISP as a process of learning: The whole team, which includes subject teachers, is expected to be familiar with the ISP and to provide interventions when needed, whereas school librarians are regarded as the experts for information literacy and as the only team members responsible for instruction and interventions in this area, that is, aspects related to the concepts of information location, evaluation, and use (Kuhlthau, Maniotes, & Caspari, 2007, pp. 57; 141). The Big6 are more oriented towards teachers; for each of the six stages the authors make recommendations for activities, with an emphasis on those which classroom teachers could use. Also, they suggest that classroom teachers use the Big6 as a framework for teaching, that is, for student learning experiences that are in some way or other related to information or information technology, and in this context make the Big6 stage(s) or skill(s) they are referring to explicit to students (Eisenberg & Berkowitz, 2000, pp. 39–53).

This section of the literature report reviewed major texts about collaborative information literacy teaching, first about the need to integrate information literacy teaching with subject content, then about the role of the librarian and finally about the role of the teacher in collaborative information literacy teaching. More literature about school librarian-teacher collaboration is discussed in part two (especially in 2.3.3 and 2.3.4.), where the focus is on empirical studies about teachers. Before moving to the second part, the next section summarizes the findings of the first part of the literature review.

2.2.5 Summary and Gaps in Knowledge

The first part of the critical literature review discussed key theories, models, definitions, beliefs about practice, and terms related to information literacy, information literacy learning, information literacy teaching, and school librarian-teacher collaboration.

As far as definitions of information literacy are concerned, the literature review leads to the following summarizing claims:

- The literature abounds with definitions of information literacy, and despite more or less important differences, the majority of them include the identification of an information need as well as the location, evaluation, and use of information.

- Several authors criticize the tendency to consider information literacy as a universally applicable concept and emphasize that it should not be separated from its context.

- Information literacy competes with other concepts, for example, computer literacy, digital literacy, online literacy, visual literacy, and in Germany especially with media literacy; also, it is either regarded as an overarching concept that includes these and other literacies or as being part of another overarching concept, such as 21st century skills, or multi-literacies.

- For information literacy to become a meta-literacy, information literacy definitions need to be more explicit in their formulation of the components related of the access, critical evaluation, use, production, and sharing of information and knowledge in participatory digital environments.

The literature review leads to the following statements about information literacy models and information literacy standards:

- A major distinction regarding models is that between those that have an (own) research base, for instance, Kuhlthau's ISP and Bruce's Seven Faces, and those that have not, such as Eisenberg and Berkowitz' Big6, Herring's PLUS model, Dannenberg's LIK IL Model, Homann's DYMIK, and SCONUL's Seven Pillars.

- An important shortcoming of the second group is the neglect or minimization of the early phases in research processes.

- Other differences between the models are a disparity in the categorization of information skills and conceptions, the underlying learning theories or the degree of adherence to them and as a consequence their approaches to information literacy teaching, and the description of the roles of librarians and teachers in collaborative information literacy teaching.

- Common to all the models is the difficulty to embrace the complexity and variety inherent in individuals' engagement with their information environment.

- Information literacy standards, which per definition are destined to be used in teaching, have been criticized both for holding too narrow or too broad of a conception of information literacy.

- Information literacy standards are partly published in separate documents, which are typically recommendations from library organizations and institutions, and partly included in official subject-related standards, and, as such, can become mandatory.

- Despite risks such as an overemphasis on measurability or on goals at the expense of process and individuality, they can help to enhance transparency, facilitate school librarian-teacher collaboration, and strengthen the position of librarians.

As far as information literacy learning and teaching is concerned, the following summarizing statements can be made:

- Depending on the underlying learning theory, the development of information literacy is either regarded as the acquisition of skills and attributes (behaviorist theories), an individual and social process of building new and deep knowledge that takes into account its context (constructivist theories), or as experiencing information literacy in new and more complex ways (variation theory).

- The initiation of information literacy learning as described in each of these theories requires the use of specific teaching strategies; during several decades there has been an overemphasis on behaviorist approaches so that important efforts have been made for inviting school librarians and teachers to implement constructivist approaches, and, to a lesser extent, relational approaches.

- Given the differences in students' learning styles, abilities, prior experiences and knowledge, and motivation, school librarians and teachers need a repertoire of teaching methods that they can employ flexibly and in concordance with the learning objectives and content of each educational unit.

- In the school context, teachers typically create situations where students may recognize an information need through the assignment of research tasks.

- Information literacy learning includes both learning with and learning about information. The former distinguishes between objectivist as opposed to constructivist types of learning, such as inquiry learning, problem-based learning, authentic and meaningful learning. The latter refers to the notion of critical thinking and its expansion critical information literacy, according to which the concept of information literacy itself needs to be questioned and the ideological, historical, socio-cultural, socio-economical, and sociopolitical dimensions of information should to be taken into account.

The literature review leads to the following statements about the collaboration between school librarians and teachers for information literacy teaching:

- There is largely unanimity in the literature about the need to integrate information literacy teaching with subject content.

- There also is largely unanimity about the role of the school librarian: He is seen as a resource for students and teachers, as being an important support in the planning phase, and, especially, as a teacher and a leader of information literacy development.

- There is less unanimity about the role of the teacher: He is seen as a facilitator of information literacy teaching in the sense that he opens his classroom or courses for integrated information literacy units and as the subject expert, but less clarity exists regarding his role as a teacher of information literacy.

This part of the literature review revealed considerable gaps in knowledge:

- About teachers' conceptions of information literacy learning: The vast majority of the literature about information literacy has been published by the LIS profession, literature from and about education professionals is scarce. The present study helped

to close this gap by investigating how teachers perceive of student information literacy learning.

- About the role of context in information literacy teaching: Information literacy has longtime been considered and employed as a universally applicable concept; more recently, several researchers have questioned this approach. The present study provided a contribution to closing this gap by investigating how, if at all, information literacy teaching is shaped by knowledge domains.

- About the role of teachers in information literacy teaching: The role of the school librarian in information literacy teaching is well-defined in the literature, whereas there is less clarity about the role of the teacher. The present study made a contribution to closing this gap by investigating how, if at all, teachers teach information literacy, either alone or in collaboration with the school library and librarian.

The second part of the literature review focuses on empirical research about teachers and information literacy.

2.3 Part 2: Research about Teachers

This part of the literature report reviews studies about the teachers' perspective on student information literacy learning, information literacy teaching, and collaboration with the school library. Only a limited number of studies dealing exclusively with these topics could be identified. Therefore, studies are also taken into account in which only a part of the research questions deal with one ore more of these topics and studies in which the teachers' perspective is only one among many others that is investigated, for example, together with that of librarians or administrators. Studies of the latter type were only integrated into this report when they displayed quantitative results or qualitative findings separately for the various groups in order to clearly identify the teachers' perspective or when teachers represented the vast majority of the sample.

The focus is on secondary teachers but key studies involving primary and tertiary faculty are also included, the latter especially for aspects for which not much research about secondary teachers was available. As for the previous parts of the literature review, the main countries taken into account here were the USA, the UK, Australia, and Germany. However, important

studies from other countries, for example, New Zealand were also included. In Germany, there is no tradition of research about school libraries, school librarian-teacher collaboration, or information literacy similar to that in Anglo-American countries. More widespread are studies about the use of media, computers, and the internet in the classroom, and especially evaluations of publically funded programs to implement media and information technology in schools (Tulodziecki & Grafe, 2012, pp. 50–51). As far as teachers are concerned, the focus of research has been on teachers' integration of information technology and digital media into their teaching (for example, Arenz, Huth, & Pfisterer, 2011; Breiter, Welling, & Stolpmann, 2010; Eickelmann & Schulz-Zander, 2008; Müller, Blömeke, & Eichler 2006), and media literacy of pre-service teachers (for example, Blömeke, 2003 and Blömeke, 2007). German studies were only taken into account when they dealt with in-service teachers and covered aspects that are closely related to information literacy.

The report is organized predominantly around themes not studies (Creswell, 2008, pp. 113), so that different results or findings of a particular study are reported under the respective themes; the research design of each study is described when mentioned for the first time. Concepts of information literacy underlying the studies vary so that it was necessary to report results and findings in more detail by summarizing, paraphrasing, or directly quoting items used in instruments. The section concludes with a summary of major themes and methodologies and an identification of important gaps.

2.3.1 Teachers' Conceptions of IL and Student IL Learning

This subsection reviews results from research about teachers' conceptions of information literacy and student information literacy learning. First, it presents three key phenomenographic studies separately; then, it organizes results around themes, which were derived from LIS information literacy concepts. Afterwards, studies are discussed about the importance that teachers give to student development of information literacy and studies about teachers' conceptions of students' strengths and weaknesses. The subsection ends with research about intervening conditions, a term borrowed from Corbin and Strauss (1998) and expanded in this study for describing factors that shape teachers' conceptions or practices.

2.3.1.1 IL as experienced by teachers

Three major phenomenographic studies examined teachers' and information literacy. Phenomenography is a type of qualitative research with "a focus on exploring how human

beings make sense of experience and transform experience into consciousness" (Patton, 2002, p. 104); the aim "is to depict the essence or basic structure of [the] experience" (Merriam, 2009, p. 24). The emphasis is on shared rather than individual meaning (Andretta, 2007) and on variation rather than commonality within and across individuals (Webber, Boon, & Johnston, 2005).

One of the studies, carried out by Williams and Wavell in the UK in 2005, sought to identify secondary school teachers' conceptions of student information literacy and of information literacy teaching. The 31 participants from nine different schools were self-selecting and covered a broad variety of disciplines: computing (7), science (7), social subjects (6), English (5), support for learning and guidance (3), art (1), home economics (1), and modern languages (1). Data were collected in three stages: in a semi-structured group discussion at the outset of the study, then through teachers' written reflections (in journal logs) and oral reflections (in informal meetings with the researchers) about their observations of students' engagement with information, and finally in a second group discussion. The first focus group discussion sought to identify teachers' initial conceptions of information literacy and information literacy learning, for example, through teachers' descriptions of student strengths and difficulties with information tasks. The second or reflective phase was used for introducing teachers to information literacy materials (definitions, models, and frameworks) developed by the LIS profession, and the last group discussion was meant to identify any changes in teachers' conceptions and their reactions to information literacy materials provided to them in the second phase (Williams & Wavell, 2006a; Williams & Wavell, 2007). The two researchers found that the secondary teachers perceived of student information literacy in terms of six categories:

> *Finding information conception:* Gathering information, mainly facts, by using information technology and the school library; being able to navigate a variety of sources and especially the web;
>
> *Linguistic understanding conception:* Comprehension of written or oral information, including teachers' instructions, worksheets, and exams;
>
> *Making meaning conception*: Combining located information and existing knowledge for the creation of new subject knowledge; is about cognitive competencies, for example, making a summary, a synthesis, an interpretation, a decision; is a matter of students' age and maturity;

Skills conception: Development of a large number of practical and cognitive skills. At the beginning of the study, teachers were not aware of the broad variety of skills involved in research tasks;

Critical awareness of sources conception: Evaluating and establishing quality of sources;

Independent learning conception: The ability to independently use the information literacy skills and strategies that are necessary for dealing with a new information task or purpose. The ultimate goal of information literacy is independent learning.

The majority of participants expressed several of these conceptions, which are partly overlapping. The researchers emphasized that teachers themselves did not identify a hierarchy and that conceptions evolved during discussions: the information finding conception was crucial at the beginning, but, as the study continued, teachers gained a broader and deeper understanding of information literacy (Williams & Wavell, 2006a; Williams & Wavell, 2007).

The two other phenomenographic studies were about tertiary faculty. In Bruce's (1997) research, undertaken in 1994, 60 higher educators (5 counselors, 18 lecturers, 31 librarians, and 6 staff developers) from six universities in Australia, one in England, and one in Fiji participated. The sample was selected purposefully: participants were chosen because they were considered to be competent information users, interested in information literacy but not experts in information literacy. The primary technique of data collection took the form of 16 face-to-face interviews with participants from two Australian universities (4 counselors, 4 lecturers, 4 librarians, and 4 staff developers); in addition, the investigator collected written data from 44 participants. Although the study included librarians and was not only about lecturing staff members, and findings were not reported for the different groups of participants separately, it was decided to present it here because of the following three reasons: (1) in interviews, which produced the prevalent type of data, 75% of participants were non-librarians; (2) among participants there were no information literacy specialists, and, (3) most importantly, because it is internationally recognized as a seminal study (Andretta, 2012; Catts, 2005; Chevillotte, 2009; Herring, 2010; Ingold, 2005; Johnston & Webber, 2003; Kerr, 2010; Maybee, 2006; Moore, 2006; Rauchmann, 2009; Weetman DaCosta, 2010). Bruce found seven information literacy conceptions with each participant experiencing information literacy in more than one way:

Category 1 (C1): The information technology conception: Refers to the use of information technology for information location and communication. Information searches, for example, on the web, happen arbitrarily rather then goal-oriented, the overall goal being staying informed. The actual use of the located information is not important. Information literacy, according to this conception, can be experienced as both impossible to reach because of constant changes in information technology or possible to achieve in a community in which the various members help each other.

Category 2 (C2): The information source conception: Refers to the location of information within sources. It requires knowledge about what is sought and about sources and may include various types of sources: print, library, electronic, and human. For some participants, the location of information needed to occur independently, for others it could also be done with the help of an intermediary, for example, a librarian. The actual use of the located information is not important.

Category 3 (C3): The information process conception: Refers to the execution of a process. It starts with an information need, that is, a new situation, in which a lack of knowledge or information is experienced. The gathered information is used to take action, to solve a problem, or to take a decision. Information technology is not important. Descriptions of processes were different from one participant to another.

Category 4 (C4): The information control conception: Controlling information is crucial. It implies selecting potentially useful information and organizing or storing it so that it can be easily found later when needed. Information can be stored by means of filing cabinets, the human brain, or computers, for example, electronic databases.

According to these four categories, information is perceived as constant, objective, and external to the individual, whereas it is seen as changing, subjective, and becoming part of the user and changing him in the next three categories:

Category 5 (C5): The knowledge construction conception: Refers to the use of information in order to create knowledge in a new field. It encompasses critical thinking, evaluation, and analysis in order to develop a personal perspective. Information technology is secondary and can even be a barrier. It does not require knowledge of sources.

Category 6 (C6): The knowledge extension conception: Refers to the use of new information in order to extend prior knowledge (as developed in C5). It requires a high level of prior knowledge and openness for intuition. It leads to new and creative ideas. The extended knowledge is built not only from academic texts (as in C5) but also from personal experience. Information technology is not important.

Category 7 (C7): The wisdom conception: Refers to the wise use of information so that others benefit. It is related to social responsibility and implies the acknowledgment of personal values and beliefs. It requires a solid portion of extended knowledge (as described in C6). Information technology has a negative connotation.

As could be seen in the descriptions above, Bruce identified relationships between the categories and organized them hierarchically: they grow in complexity from the information technology conception at the bottom (C1) to the knowledge extension and the wisdom conceptions at the top (C6 and C7) (Bruce, 1997).

The third phenomenographic study, undertaken by Webber, Boon, and Johnston in the UK in 2003-2004, investigated academics' conceptions of information literacy in four disciplines (Chemistry, Civil engineering, English, and Marketing). Altogether 80 tertiary faculty members (each time 20 per discipline) from 26 universities took part in interviews. The sample was selected purposefully with the aim of achieving as much variation as possible in terms of gender, age, type of university, and type of department. A major contribution of this study was the identification of differences between disciplines; they will be discussed below under "intervening conditions" (section 2.3.1.5). The researchers also found similarities. In their reports about English and marketing faculties they stated that academics from the two disciplines shared a conception of information literacy as locating and retrieving information, possessing a set of elementary research skills that can be used on need, developing critical thinking, and being related to independence. Differences between disciplines were found within these categories and are also referred to below (Boon, Johnston, & Webber, 2007; Webber, Boon, & Johnston, 2005). More findings from the three phenomenographic studies are reported together with those from other studies in the next paragraphs.

2.3.1.2 Conceptions of particular IL categories

Studies about teachers' conceptions of information literacy are scarce. However, several of those who addressed the issue, presented findings for the various information literacy concepts and competencies which are part of information literacy models. In order to compare them more efficiently, the findings are presented here in groups of the following themes rather than study by study: information need, information location, information evaluation, information control, information use, ethical use of information, information presentation, information process, and the use of information technology.

Information need

With regard to information need, Williams and Wavell (2007) found that teachers perceived of student definition of an information need as understanding the task assigned by the teacher rather than an opportunity for authentic learning. One of the major findings of Boon, Johnston and Webber (2007) was that the tertiary faculty involved in their study did not mention the identification of an information need at all. In a survey in which 40 teachers from four New Zealand primary schools participated, Moore (1999) found that only 50% of teachers were able to identify different steps in information processes, but for them determining an information problem (and locating information) were the two most important ones.

Information location

Information location was also found to be predominant in teachers' information literacy conceptions in other studies than Moore's (1999). It was the information literacy conception that was prevalent at the beginning of Williams and Wavell's study (2007); teachers gained a more complex understanding of information literacy only as the study progressed, that is, after having been informed about LIS information literacy concepts and frameworks by the researchers and as a result of two group discussions. As far as types of sources are concerned, the two researchers found that teachers perceived of information literacy as using sources in physical and electronic format but not human sources.

Probert (2009) undertook a mixed methods study in three New Zealand schools (grades 7 to 13), which had formed a cluster with the aim of improving student information literacy for enhancing independent learning. In the web based survey, administered at the beginning of the project in 2007, in which 148 out of 200 teachers participated, she asked a limited number of

open-ended questions, including one that invited teachers' to describe an information literate person. The most mentioned term was "finding" with 29% of participants using it. In a constructivist grounded theory study in grade seven in three Australian schools, Herring (2010) found in interviews with six subject teachers (three history, one science, and two language teachers) that most of them perceived of information literacy in terms of skills and especially the ability to locate information, that is, finding a variety of sources and information within them.

In a mixed methods study undertaken by Purcell et al. (2013) in all 50 US states, Puerto Rico, and the US Virgin Islands in the context of the Pew Internet and American Life Project in winter 2011 and spring 2012 with middle school educators (9%) and high school educators (91%) who were teaching predominantly (95%) in public schools, 56% of surveyed teachers (N=2,462) perceived "finding information quickly" as "essential" and another 40% as "important but not essential" for students' success in their future lives. However, in a list of eight competencies, where it was the only one that had to do with the location of information and when teachers' ratings of skills as "essential" are taken into account, it was only ranked sixth in importance.

Information evaluation

For another aspect of information literacy found in LIS frameworks, evaluation, an earlier study about teachers found that it was not part of teachers' information literacy conceptions (Moore, 1999) whereas the recent study undertaken by Purcell et al. (2013) showed that "judging the quality of information" as a competency that their students need for success in their future lives was perceived as "essential" by 91% of surveyed teachers, ranked highest of the eight competencies, and it was considered as "important but not essential" by the remaining 9%. These results were confirmed in semi-structured focus group discussions, during which participants also mentioned quality and relevance as the predominant criteria of evaluation (Purcell, Heaps, Buchanan, & Friedrich, 2013). Another qualitative study reported that teachers perceive of evaluation only as evaluation of sources but not as evaluation of the information process (Williams & Wavell, 2007).

Information control

Organization or control of information was one of the information literacy conceptions Bruce (1997) identified, but other researchers found that it did not play an important role in

educators' conceptions of information literacy (Williams & Wavell, 2007) or no role at all (Boon, Johnston, & Webber, 2007; Moore, 1999).

Information use

While information use was the third most mentioned (19%) in teachers' descriptions of an information literate person in the survey in Probert's (2009) study, participants in the research undertaken by Williams and Wavell (2006a) were not sure whether information use in the sense of analysis and interpretation are part of information literacy: They perceived of information literacy in terms of cross-curricular skills rather than a way of learning, and as a barrier rather than an opportunity for enhanced development of subject content. Although they considered independent learning as a major goal of information literacy, they were not clear about its relationship with information use. Also, the teachers in Moore's (1999) study did not mention information analysis in their descriptions of information processes. Purcell et al. (2013) found that among teachers who participated in focus group discussions (N=188) in addition to evaluation of information, the synthesis of information from multiple sources was the other most cited skill that students should develop.

Ethical use of information

With regard to ethical aspects, Purcell et al. (2013) reported that 85% of surveyed teachers (N=2,462) perceived of responsible online behavior as an "essential" skill that their students should develop and it was ranked third of eight competencies; another 14% perceived of it as an "important but not essential skill". Williams and Wavell (2007) found that teachers had a narrow view of ethical use of information, talking about their students' copy and paste behavior only and the necessity of citing sources without addressing the notions of "social responsibility" and "values".

Information presentation

Presentation of information was mentioned by a minority of teachers (3%) in Probert's (2009) survey and William and Wavell (2006a) found that teachers perceived of it mainly as students reporting facts instead of new knowledge built from the found information, and that educators underestimated the implications of the selected target audience for the whole information task. In Purcell et al.'s (2013) study "communicating ... ideas in creative, engaging or interesting ways" was "essential" or "important but not essential" for 99% of survey respondents and

"writing effectively" for 97% of them; it should be emphasized that almost 30% of the sample were National Writing Project teachers and 36% English teachers.

Information process

As far as perceiving of information literacy as a process is concerned, Webber et al. (2005) found that both English and marketing academics perceived of it as a set of skills and for the latter they noted that "there may be explicit articulation of a process, but the emphasis is on developing individual skills within that process, rather than developing a holistic concept of the process itself" (p. 11).

Information technology use

Another finding of Probert (2009) was that the secondary teachers considered information literacy as being closely related to the use of information technology: 25% of surveyed teachers agreed that the two are the same while 27% were not sure. It also was the second most mentioned (22%) in educators' descriptions of an information literate person. Purcell et al. (2013) reported that 42% of teachers think students "know more about" digital technologies than their teachers do, whereas 40% think that teachers' and students' level "are usually about equal".

The results from the various studies about teachers' conceptions of the various information literacy categories are partly confirmatory and complementary but also partly contradictory. More research is needed to gain a more comprehensive and deeper understanding.

2.3.1.3 Perceiving student development of IL as important

Several studies showed that teachers perceive student development of information literacy as important (Birmingham et al., 2008; Herring, 2010). In a German study in 11 primary and secondary best practice schools in terms of integration of digital media the vast majority of teachers (90.5%; N=180) noted in a web-based survey that they consider knowledge about digital media as being part of "general education", especially as a preparation for students' future professional lives and as a means for information gathering (Eickelmann & Schulz-Zander, 2008). All 15 department heads or team leaders who participated in semi-structured interviews in Probert's (2009) study considered the development of students' information literacy as important. The teachers in Williams and Wavell's (2007) study also perceived of

information literacy as important. However, although the teachers themselves did not identify a hierarchy in the six information literacy conceptions, the researchers found that they were not important to the same extent for teachers. Independent learning seemed to be the ultimate goal and linguistic understanding was regarded as an important prerequisite. The ability to make meaning from the gathered information was regarded as crucial for senior students. The importance teachers gave to critical awareness of sources depended on knowledge domains and is discussed below.

In the USA, Saunders (2012) collected data in a brief web-based survey with mainly closed-ended questions from 278 academic staff members from colleges and universities across the country; 96.7% of them "strongly agree[d]" or "agree[d]" that "information literacy is an important concept for college students to master". Weetman undertook two quantitative studies for identifying faculties' conceptions of information literacy: one at De Montfort University (DMU) in the UK in 2004, the other at The College of New Jersey (TCNJ) in the USA in 2007. In both cases he invited academic staff members responsible for modules in the last year of the undergraduate program from all faculties to complete a paper-and-pencil survey; in the second study he used a shortened version of the first instrument. The response rates were 21% (98 out of 478) at DMU and 18% (61 out of 333) at TCNJ. Weetman found that at DMU 93% of participants and at TCNJ 98% "strongly agree[d]" or "agree[d]" that students should be able to "recognise when information is needed and have the ability to locate, evaluate and use effectively the needed information" when they finish their degree program (Weetman, 2005; Weetman DaCosta, 2010).

The development of their students' information literacy obviously is important to teachers. The next subsection reviews research about students' strengths and weaknesses regarding information literacy as perceived by teachers.

2.3.1.4 Conceptions of students' strengths and weaknesses

Researchers also investigated how teachers perceive of students' strengths and weaknesses with regard to information literacy.

In the UK, Williams and Wavell (2006a) found that if they do it at all, teachers observe student information literacy informally and superficially and that educators think students have all the information literacy skills needed, although they recognize that there are

differences between students. However, their participants noted that, as far as information finding is concerned, students are becoming better information technology users but also that many students are not able to make meaning from the information they gather. Teachers said that students have difficulties with cognitive skills and techniques, for example, with determining the level of importance of information and with paraphrasing.

In New Zealand, Moore (1999) found that teachers were aware that students may have problems with every step in the research process. The majority of teachers in Probert's study (2009) did not assess students' information literacy competencies at the beginning of the school year but assumed that they had already developed them at a good level. In three New Zealand co-educational schools Ladbrook and Probert (2011) studied grade 10 English teachers' beliefs about student information technology literacy by means of a survey (in which 24 out of 33 teachers participated during a departmental meeting). They found that teachers thought students prefer to use the internet for information finding and communication, are good information technology users and better than their teachers, and have difficulties especially with evaluation, that is, establishing quality of information and relevance, but also with reading, extraction, analysis, and synthesis, and they make much use of copying and pasting.

In Germany, a comparatively large study in the German state of North-Rhine Westphalia with teachers from grades five and six (N=1458) from a broad variety of schools reported that 57% of teachers found that their students' media literacy had improved over the past two years. However, teachers rated their students' competencies as average or low. On a scale from 1 ("very low") to 10 ("very high") the arithmetic means for "searching the internet" was 5, it was 3.5 for "thoughtful use of media", 2.8 for the "development of presentations", and 2.8 for evaluation of content (Breiter, Welling, & Stolpmann, 2010). Merchant and Hepworth undertook a qualitative study in two secondary schools in the UK. In each school ten teachers from different subject departments participated. Teachers thought the most difficult information literacy aspects for students were information analysis, evaluation in terms of accuracy and reliability, and that they have a tendency to search for the right answer (Merchant & Hepworth, 2002). Gordon undertook a qualitative action research study in an international school in Germany about the implementation of an authentic research assignment in grade 10 and reported that the five participating teachers found that students experienced searching for information and analyzing it as the most difficult parts in the information process (Gordon, 1999).

In the USA, Purcell et al. (2013) asked teachers to rate students' "research skills" and their "writing skills" and they reported the following results:

- As far as *information location* is concerned, the majority of surveyed teachers (68%, N=2,462) considered their students' "ability to use appropriate and effective search terms and queries" as "excellent", "very good" or "good". However, teachers thought that students lack "patience and determination in looking for information that is hard to find": 43% of teachers rated students as poor at it and 35% as fair.

- The majority of teachers were not satisfied with students' ability to *evaluate information*: their "ability to recognize bias in online content" was rated as poor or fair by 71% of teachers, and their "ability to assess quality and accuracy of information they find online" as "poor" or "fair" by 61%.

- With regard to the *use of information*, teachers qualified their students as "excellent", "very good" or "good" in the following skills: "effectively organize and structure writing assignments" (67%) and "understand and consider multiple viewpoints on a particular issue or topic" (60%).

- There was less unanimity among participants with regard to *two other skills* for which students were qualified as "excellent", "very good", or "good" altogether only by slightly more than half of participants: "synthesize content and information from multiple sources into a cohesive piece of work" (55%) and "construct a strong argument" (51%).

- Overall predominantly considered as "excellent", "very good", or "good" was also a skill related to *presentation of information*, that is, "use mixed media or multimedia to express their ideas" (78%) but only 56% of educators thought that students were able to "use tone and style appropriate for their intended audience".

- At the low end and rated with "fair" or "poor" by the majority of teachers were "*read* and digest long or complicated texts" (69%) and skills related to the *ethical use of information*, that is, "navigate issues of fair use and copyright in composition" (67%), and "appropriately cite and/or reference content" (57%).

However, it should be mentioned that the majority of participating teachers (56%) had to do with rather high achieving students as they taught Advanced Placement (AP), honors or other accelerated classes (Purcell, Heaps, Buchanan, & Friedrich, 2013).

What teachers know about their students' information literacy seems to be based on informal observations rather than formal assessment. They tend to be rather dissatisfied with their students' information literacy, with the whole range of competencies, not just cognitive ones, such as evaluating information, making meaning of it, or synthesizing it, although they consider them as particularly challenging.

2.3.1.5 Intervening conditions

Conditions that shape teachers' conceptions of information literacy are their disciplines, and, to a lesser extent, their years of teaching. First research about the former is reported.

Knowledge domains

Probert (2009) distinguished three levels of information literacy understanding: good, limited, and little understanding. She found that two-thirds of teachers had a limited or little understanding of information literacy and only five percent had a good understanding. The teachers who had a good or limited understanding of information literacy were English, languages, and social studies teachers, whereas those who had little understanding of information literacy taught mathematics, science, technology, health, and physical education. Williams and Wavell (2006a) found some indications that across subject disciplines teachers had similar concepts of information literacy but a different emphasis, for example, a student's ability to evaluate sources was especially important to history and English teachers, and in terms of the criteria of evaluation, history and English teachers emphasized bias whereas currency was more important for science teachers.

At the tertiary level, Webber, Boon, and Johnston (2005) identified differences between disciplines within the shared information literacy conceptions, for example, within the information access conception. While for English faculty information literacy was predominantly about accessing information in print format and especially books, for marketing faculty it was about locating information in a variety of sources. And the researchers found differences between disciplines in the information literacy conceptions as such. They identified the following four information literacy conceptions of English

university faculty: (1) Accessing and retrieving textual information; (2) using information technology to access and retrieve information; (3) possessing basic research skills and knowing how and when to use them; and (4) becoming confident autonomous learners and critical thinkers. And they found the following six conceptions of marketing faculty: (1) accessing information quickly and easily; (2) using information technology to work with information; (3) possessing a set of information skills and applying them to the task at hand; (4) using information literacy to solve real-world problems; (5) becoming a critical thinker; and (6) becoming a confident, independent practitioner.

Purcell et al. (2012) found slight differences between subject groups in teachers' conceptions of students' use of types of sources. The science teachers in their study tended to say to a higher degree that students "are very likely" to use online encyclopedias for research tasks than English teachers (science: 82% vs. English: 69%). English teachers (44%) were also least likely (the average was 52%) to consider students' use of "YouTube and other social media sites" as "very likely". But as far as traditional types of sources are concerned, teachers of math (8%) and science (7%) tended less than other teachers (the average was 12%) to say that students are "very likely" to use printed sources, whereas English teachers (20%) tended to a higher degree than the average (16%) to qualify their students seeking help from a librarian as "very likely".

Length of teaching

For educators' teaching experience, Purcell et al. distinguished between the following groups: "5 or fewer", "6 to 10"; "11 to 15"; "16 to 20", and "21 or more". The researchers found that teachers with 15 years or less of teaching experience were slightly less likely (52%) than those with 16 years or more of teaching (60%) to consider the ability to find information in a fast manner as "essential" for their students' future lives. And newer teachers rated their students' research skills lower than their more experienced colleagues (Purcell et al., 2012; Purcell, Heaps, Buchanan, & Friedrich, 2013).

Indications that teachers' conceptions of information literacy are influenced by the subjects they teach are rather strong, whereas indications that they are influenced by the length teachers have been teaching are rather weak. As far as subject groups are concerned, differences exist not only between them regarding conceptions of information literacy but also regarding the elements included in these conceptions. The next subsection reports research about teachers' and information literacy pedagogy.

2.3.2 Teachers and IL Teaching

Research about educator's conceptions and practices of information literacy teaching is reported here. Before an overview of this subsection is presented, the findings of Williams and Wavell's (2006a; 2007) aforementioned phenomenographic study are reported. In their investigation with 31 secondary teachers from nine different UK schools the two researchers also identified conceptions of teaching for the six information literacy conceptions their participants held:

> *Finding information conception:* Teachers perceived of it as being related to project work, which they considered as easy to organize and handle, as being supported by curriculum requirements, and as an opportunity to enhance student motivation.
>
> *Linguistic understanding conception:* Teachers were unsure about their impact on this aspect and how they could help students.
>
> *Making meaning conception*: The majority of teachers expressed a low sense of control as far as aspects related to knowledge building are concerned and were not sure how they could help students. Those few teachers who began to identify strategies for helping students to make connections between new information and previous knowledge tended to have additional assignments to their subject teaching, for example, support or senior management, and involvement in professional development. Strategies they referred to were discussions with individual students or with the whole class.
>
> *Skills conception*: Teachers thought that they could somewhat influence student development of information literacy skills but most of them did not perceive of it as one of their teaching priorities.
>
> *Critical awareness of sources conception:* Teachers thought that they had some control over student development of concepts and competencies regarding evaluation of sources.
>
> *Independent learning conception:* Teachers were unsure how they could help students to develop as independent learners, given the strict curricular requirements.

In summary, teachers experienced varying degrees of control regarding student development of information literacy: highest was it for information finding and lowest for cognitive skills and processes.

The next subsections review studies about teachers' practices and conceptions of the use of information literacy models in their teaching, then studies that reported that teachers do teach information literacy followed by those reporting that educators do not teach information literacy or not teach particular information literacy categories. Finally research about intervening conditions is reviewed.

2.3.2.1 Teaching with IL models

In the LIS literature, information literacy models and other frameworks are widely recommended as a means to support information literacy teaching and learning. Several studies sought to establish educators' conceptions and/or practices.

There are teachers who think that students benefit from using an information literacy model. Herring investigated teachers' perspective in two different studies in the UK about the use of the PLUS information literacy model, which he developed (Herring, 1996). In the first study (in 2002), 112 students from grade seven undertook a research project with the PLUS model and with the help of the school librarian and their teacher. In a semi-structured interview, the physics teacher described the main benefits for students of using the information literacy model as an increase in confidence in independent individual or group work, better end products, and awareness for the importance of the process in addition to content and end product (Herring, Tarter, & Naylor, 2002). In the second study in the same school in 2006, grade 8 students did a research project in physics using the PLUS model, again closely followed by the school librarian and their science teachers. The study included a semi-structured group discussion with four teachers (the two science teachers involved in the research project and two other teachers, a geography teacher and an English teacher, who collaborated on a regular basis with the librarian). All teachers thought the model and the teaching that went with it helped students in the following ways: (1) with improving their cognitive skills, for example, in the sense that they took the time to think before selecting a topic or formulating their own focus, (2) with locating and evaluating sources so that the majority of students, and not only the best ones, were able to use a variety of sources and

sources that were relevant to their topic, and (3) with writing, students became better writers because their note taking improved (Herring, 2006).

In the second phase of their study, Williams and Wavell provided participants with extensive information about information literacy, including a variety of information literacy models, for example, Eisenberg and Berkowitz' Big 6 (Eisenberg & Berkowitz, 2000) and Kuhlthau's Information Search Process (Kuhlthau, 2004) or several from the UK, for example, Marland's model developed already in 1981 or Becta's (British Educational Communications Technology Agency) "Star Model" about ICT. The two researchers reported about teachers who valued information literacy models and frameworks as useful tools either for students or for teachers themselves, and about other educators who had objections because they considered them as too simplistic. Overall only "very few" of their participants said they would use them in the near future (Williams & Wavell, 2006a; Williams & Wavell, 2007).

Probert (2009) found that most teachers did not use an information literacy model when their students undertake research. Moreover, the majority of those teachers who said that they used an information literacy model were not able to describe the stages, although they considered a school-wide model as useful and despite the fact that in one of the three schools the model was actually displayed in classrooms and teachers had received professional development about its use. Smith and Hepworth (2007) also reported about teachers not making use of information literacy models when students undertake project work.

Results about teachers' conceptions, attitudes, and practices regarding the use of an information literacy model in their teaching are contradictory within and across studies.

2.3.2.2 Teachers teaching IL

Researchers report about educators teaching students about information literacy. This subsection is organized around studies and/or countries.

School library impact studies in Indiana and Idaho

In quantitative surveys administered in the context of two more recent school library impact studies in Indiana (in 2006) and Idaho (in 2009) with similar procedures, Lance et al. asked teachers to assess the integration of the three different strands of information literacy or ICT standards when teaching alone, that is, without the school librarian. In both studies, the

majority of teachers were more than satisfied with their individual teaching; for the three strands percentages of teachers who qualified their solo teaching as "excellent" or "good" were as follows:

> In the Indiana study (N=422): for "Information Literacy" 79.5%, for "Independent Learning" 78.7%, and for "Social Responsibility" 73.1% (Lance, Rodney, & Russell, 2007).
>
> In the Idaho study (N=668): for "ICT Literacy" 69.7%, for "Independent Learning" 77.1%, and for "Social Responsibility" 73.7% (Lance, Rodney, & Schwarz, 2010).

It should be noted that the samples were not randomly selected; school librarians were invited by state library associations to participate and asked to nominate up to five teachers with whom they had been closely collaborating. This type of question was not asked in the Pennsylvania study (2012), for which other results are presented below.

School library impact study in Wisconsin

In the quantitative survey administered in the context of the Wisconsin impact study undertaken by Smith in 2005, in which 107 teachers from 51 public schools selected through random quota sampling participated (40.2% from elementary schools, 19.6% from middle school, and 35.5% from high schools), slightly more than half (51.4%) reported that they had aligned subject content with Information and Technology Literacy Standards (ITLS) and integrated them into their teaching. For school year 2004-2005, 60% of teachers reported that they had taught between two and four integrated units (Smith, 2006a).

The Pew Internet Study

In the US survey administered by Purcell at al. (N=2,462) in the context of the Pew Internet and American Life Project in winter 2011 and spring 2012, when middle and high school teachers were asked how often they had assigned or would assign particular tasks to their students in the academic year in which the study took place, the vast majority reported about weekly (56%) or monthly (25%) having students "write a short essay, short response or opinion piece". Each time 77% of participants reported about having students at least once "write a research paper" or "create a multimedia or mixed media piece incorporating video/audio/images" and 66% reported having students "engage in creative writing such as poetry, plays, fiction or short stories" at least once. The researchers also noted that in the

focus group discussions (N=188), "many" teachers reported that they assign extended research tasks, which take the entire academic year to complete and which are broken into various steps. In the context of these big research assignments, educators perceived the following pedagogical strategies and interventions as crucial:

- Showing students how to develop a focused research question and a plan of what they should be looking for, to help them 'sort through the noise',
- Requiring students to utilize more than online resources,
- Teaching students how to properly cite the sources they use, particularly online sources,
- Developing a student's ability to determine the timeliness, relevance, and quality of the online information they find,
- Teaching students how to appropriately paraphrase and synthesize information.

In the survey, teachers were also presented a list of pedagogical approaches to addressing research skills and asked which of them they use. After directing students towards particular sources, the second most mentioned approach was to "develop research questions or assignments that require students to use a variety of sources, both online and offline" (83%). Teachers also reported about spending class time on particular information literacy aspects: for discussions with students about "how to assess the reliability of information they find online" (80%), "how to generally conduct research using the internet" (71%), and for "helping students improve their search terms and queries" (57%). Another question asked teachers about their pedagogical interventions regarding ethical use of information. The majority used class time for discussing with their students "the concepts of citation and plagiarism" (88%) and "the concepts of fair use and copyright" (75%). An important number (71%) also reported that they "check student work for plagiarism using an online resource such as Turnitin.com or by entering student text into a search engine". Most teachers "strongly agree[d]" (47%) or "somewhat agree[d]" (44%) with the statement that "courses or content that focus on digital literacy must be incorporated into every school's curriculum". However, in the focus group discussion there was no unanimity about the best time in students' school careers when the respective skills should be taught, in elementary school or in middle and high school, and by whom, English teachers or all subject teachers together with librarians (Purcell et al., 2012; Purcell, Buchanan, & Friedrich, 2013).

US studies at tertiary level

In three separate studies at Florida State University Latham and Gross asked high- and rather low-achieving college students "to look back on their experiences with information literacy in K-12 education" and to explain how they learned what they know about information literacy.

In the first study, in which juniors and seniors participated, 33% (nine students) noted that classroom teachers had taught them. The second study was undertaken with college freshman at the very beginning of the academic year and found that 26% (13 students) noted that classroom teachers taught information literacy, while that number jumped to 65% (13 students) in the third study in which college freshman at the near end of their first academic year participated (Latham & Gross, 2008).

More than three-fourths (77.6%) of academic faculty (N= 278) in Saunders' US-wide study (2012) "strongly agree[d]" or "agree[d]" with the statement "I address information literacy concepts (such as how to conduct literature reviews, cite sources, synthesize information, etc.)", while only (55.2%) "strongly agree[d]" or "agree[d]" with the statement "I assess students on information literacy abilities".

In their study with first-year English writing teachers at two colleges and a university in the USA, Birmingham et al. (2008) found that all 49 participants assigned research papers or projects to their students, and only two of them did not provide any instruction to help students go through the process whereas 83% used five or more strategies to do so. Strategies teachers employed included:

- Using a laddered assignment approach; breaking students' research into smaller, manageable tasks that build upon one another",
- Designing in-class activities/assignments concerning searching for resources,
- Spending class time explaining/practicing appropriate documentation style,
- Touring the library with [their] students,
- Showing individual students how to use, access, or cite one or more specific library research tools,
- Discussing with students suitable criteria for source evaluation (e.g., authority, currency, purpose, etc.),
- Requiring students to complete one or more online tutorials concerning library research,
- Asking library staff to provide an instructional session(s) for students, and
- Allowing a librarian to contribute to the development and/or grading of some portion of a research assignment.

In his small transatlantic research, Weetmann came to the following results: In the UK institution, DMU, taken all faculties together, on average 53% of academic staff members who responded to his survey (N=98) explicitly taught undergraduate students in their final year about information literacy competencies as described in the 1999 version of SCONULS' "Seven Pillars of Wisdom" model (the 2011 version is available at http://www.sconul.ac.uk/sites/default/files/documents/coremodel.pdf [last accessed on 23. 07.

2013]), and in the US institution, TCNJ, 63% did so (N= 61). In both cases, "the ability to organize, apply, and communicate information to others in ways appropriate to the situation, e.g. to cite bibliographic references in project reports or dissertations" was taught by the highest number of participants, 71% of academic staff members at DMU and 70% at TCNJ, whereas aspects related to information location were taught by the fewest number, 46% at DMU and 38% at TCNJ. In addition, in both institutions each time 57% of the faculty reported offering student-centered learning activities for enhancing student development of the information literacy competencies as described in SCONUL's model, and 55% of the faculty at DMU and 50% at TCNJ assessed these information literacy competencies (Weetman, 2005; Weetman DaCosta, 2010).

German studies

For Germany, where the concept of information literacy is not widespread in elementary and secondary schools (Gapski & Tekster, 2009), several researchers reported teachers' conceptions and practices of teaching with information technology or digital media.

A study investigating practices of teaching with digital media through video recordings of each time one lesson of a purposefully selected sample of 20 teachers from grades 11 and 12, including both experienced and less experienced in this area and from schools across the country, identified three types of ICT teaching scripts: teacher-oriented, student-oriented, and a mixture of both. The first and the last were prevalent and thus the researchers concluded that teachers tend to integrate the new media with traditional ways of teaching rather than using their appearance as an opportunity for changing their teaching practices in order to shift the emphasis from "instruction" towards more constructivist learning (Müller, Blömeke, & Eichler, 2006).

The quantitative teacher survey (N=180) administered in the German study in 11 elementary and secondary best practice schools in terms of integration of digital media showed that altogether 60.7% of teachers thought digital literacy should be integrated in the curricula of all courses and subjects. When they were asked about the importance of digital media for their teaching, the highest number of participants considered as "important" or "very important" the role of digital media "as a support of inquiry and research activities" (ES: 63.6%; SS: 85.7%). Almost three-fourths of teachers made use of computers and the internet in their courses; among those who used digital media "at least weekly" in their teaching, only a low percentage did so to engage students in activities related to information literacy, such as

"searching information on the internet" (ES: 14.8%; SS: 16.9%), "creating multimedia products" (ES: 4.0%; SS: 8.5%), or "inquiry learning projects" (ES: 8.0%; SS: 3.5%) (Eickelmann & Schulz-Zander, 2008).

An encompassing study in one of the biggest German states, North-Rhine Westphalia, was undertaken in order to investigate educators' conceptions and practices of media literacy teaching in grades 5 and 6, the years of transition from elementary to secondary level, in a broad variety of schools, including not only regular but also schools for lower achieving and special needs students. The representative sample for the quantitative survey consisted of 1,458 teachers from more than 90 schools and it was found that almost each time around three-fourths would "agree" or "rather agree" that media literacy should be integrated "in as many subjects as possible" (74%), that it would be important to have a school program on media integration (77%), and that "digital media enhance independent learning" (78%). The majority of teachers did either "rather not agree" or "not agree" (56%) that students had been well prepared in previous grades in terms of the use of digital media, or they did not know (30%). Almost three-fourths of teachers (72%) would "agree" or "rather agree" that "uncontrolled use of the internet holds too many risks" (Breiter, Welling, & Stolpmann, 2010).

As far as teaching practices are concerned, in this encompassing study 38% of educators reported that their students use digital media in their courses "at least several times per week" or "once per week up to once per month", whereas 34% noted that they do so "at most two times per school year" or not at all. The most mentioned media-related activity was searching the internet, either through "directed searchers" (reported frequencies: "at least several times per week" or "once per week up to twice per month": 21%; "at most once per month": 27%; "at most two times per school year": 24%; "never": 28%) or "free searches" ("at least several times per week" or "once per week up to twice per month": 22%; "at most once per month": 31%; "at most two times per school year": 24%; "never": 23%). Students using digital media for information presentation was reported by the highest numbers of educators as happening "at most once per month" (14%), "at most two times per school year" (16%) or "never" (59%), and students producing digital media, for example, videos or podcasts, "at most two times per school year" (21%) or "never" by 64%. The majority of teachers (72%) also engage in critical discussions about media content with students but they do so rarely ("at least several times per week" or "once per week up to twice per month": 21%; "at most once per

month": 32%; "at most two times per school year": 29%) (Breiter, Welling, & Stolpmann, 2010).

Phone interviews with a representative quota sample of 501 teachers from grades 5 to 10 and various types of schools across Germany conducted in 2011 by a German company specialized in survey research for the Federal Association for Information Technology, Telecommunications and New Media (BITKOM) showed that in general terms more than three-fourths of teachers (77%) had a "positive" or "rather positive" attitude towards the use of computers for their teaching. The majority of teachers "agree[d]" or "rather agree[d]" that the use of computers in class helps students to learn faster (79%), and enhances student motivation (76%) and concentration (73%). The two main reasons for using electronic media in their teaching were student internet searches (88% of teachers) and then student presentations (83%) (Arenz, Huth, & Pfisterer, 2011).

2.3.2.3 Teachers not teaching IL or particular IL categories

Other studies provide evidence about educators not teaching particular information literacy categories or not teaching any at all. Most elementary teachers in Moore's study (1999) left students alone with their research task, expecting them to know what information they were looking for and to finish their information activities at home. Ten years later, Probert's findings (2009) were contradictory for educators' use of the teaching strategy of modeling the location of information from online sources: in questionnaires, 50% of teachers noted that they do it often or always but the findings were not confirmed in interviews with head of departments and team leaders. Overall she found that only a minority of teachers explicitly teach information literacy (Probert, 2009). When Ladbrook and Probert (2011) asked the 10th graders in the three co-educational schools how their teachers had helped them with their research, students reported that they had not received much help. In their predominantly qualitative study in a publically funded comprehensive secondary school in the UK with students in grades 7 and 13 (N=36) about factors that influence their motivation for doing project work, Smith and Hepworth found that students would like to have more assistance and feedback from teachers in all phases of the process (Smith & Hepworth, 2007). Merchant and Hepworth (2002) found that although most of the 20 teachers from the two secondary schools who participated in their study were information literate themselves, their information literacy competencies were not transferred to their students. These findings are confirmed by research studies about students entering or already in higher education which also show that students

lack essential information literacy skills (Birmingham et al., 2008; Franke & Schüller-Zwierlein, 2008; Head & Eisenberg, 2010; Schreiber & Sommer, 2005). The underlying assumption is that they were not given enough opportunities and did not receive the teaching and help necessary to develop these skills earlier in their school career.

Several studies found that there are teachers who tend to do part of the information process for students. There are educators who define the information need by assigning research tasks without students getting involved (Merchant & Hepworth, 2002), and who locate and pre-select sources and information for students, which also implies evaluation (Asselin & Moayeri, 2008; Merchant & Hepworth, 2002, p. 83; Williams & Wavell, 2006a, p. 45). In the list of pedagogical approaches to addressing research skills in the survey administered by Purcell et al. "direct students to specific online resources you feel are most appropriate for their assignments" was mentioned by the highest number of participants (90%) and 29% of teachers did not allow students "to use online search engines" for particular research assignments. About the latter the researchers emphasized that it was intensely discussed in focus group discussions and that "many" participants did not permit the use of particular sources, for example, Wikipedia, or recommend or even permit the use of particular websites only, or tell students to use only sites with particular domains (e.g., .gov, .org., .edu). Other teachers reported about not allowing online searches at all in order to make sure that students became acquainted with particular offline sources (Purcell et al., 2012; Purcell, Buchanan, & Friedrich, 2013). There are teachers who tend to evaluate the information process as such for their students (Merchant & Hepworth, 2002) and to require students to collect facts rather than to use information in order to construct new knowledge (Merchant & Hepworth, 2002).

The studies reviewed in the last two subsections indicate that teachers' information literacy teaching tends to occur on a rather moderate level if it happens at all. The next subsection reports research about conditions that influence teachers' conceptions and practices of information literacy teaching.

2.3.2.4 Intervening conditions

Several studies reported knowledge domains and length of teaching experience shaping teachers' conceptions or practices of information literacy teaching.

Knowledge domains

Information literacy teaching is partly shaped by knowledge domains. On a general level, Merchant and Hepworth (2002) reported that teachers of sociology, science, geography, and history are more likely to teach information literacy than heir colleagues (Merchant & Hepworth, 2002). Williams et al. found a relationship between secondary teachers' attitude towards information technology as well as their information technology use and subjects: mathematics and science teachers and almost to the same degree language teachers had the more negative attitudes and made less use of information technology in their teaching, and business and management teachers had the most positive attitudes and made the most use of information technology for teaching purposes (Williams, Coles, Wilson, Richardson, & Tuson, 2000).

In the recent BITKOM study with teachers of grades 5 to 10 from various types of schools across Germany, teachers of math, science, computer science, and technology were more likely to hold "positive" and "rather positive" attitudes towards the use of digital media in their teaching (79% vs. language teachers: 76%; other subjects: 76%), and they were more likely to "agree" and "rather agree" that students' use of computers enhances the speed of learning (85% vs. language teachers: 76%; other subjects: 77%). Language teachers were also found to be less likely to "agree" and "rather agree" that students' use of computers enhances their motivation (language teachers: 73% vs. teachers of math etc: 78% and those of other subjects: 77%) and concentration (language teachers: 68% vs. teachers of math etc.: 75% and those of other subjects: 75%) (Arenz, Huth, & Pfisterer, 2011).

The type of assignments also depends on disciplines. Purcell et al. found that English (94%) and history/social studies teachers (83%) were more likely to assign research papers at least once during the academic year in which the study took place than their colleagues who taught science (68%), or math (36%). Similarly, English (84%) and history/social studies teachers (82%) tended to a higher extent to have their students "create a multimedia or mixed media piece" at least once per year than teachers from the math department (51%); percentage was not provided for science teachers. And English (75%) and history/social studies teachers (68%) were more inclined to assign "a short essay, short response or opinion piece" at least once per week than teachers from the departments of science (36%) or math (28%) (Purcell, Buchanan, & Friedrich, 2013).

In focus group discussions, Purcell et al. also found that English teachers were the most likely to teach research skills, a finding confirmed in the survey, according to which teachers from the English department were the most inclined to use all of the pedagogical approaches listed, closely followed by history/social studies teachers. For example, "develop research questions or assignments that require students to use a variety of sources, both online and offline" was done by 93% of English teachers, 91% of history/social studies teachers, 77% of science teachers, and 47% of math teachers. Also, English teachers (94%) and history/social studies teachers (90%) tended to a higher extent to discuss evaluation of online information in terms of reliability with their classes than science teachers (69%) and math teachers (46%) (Purcell et al., 2012). English teachers were also the most likely to discuss aspects related to "citations and plagiarism" with their classes and math teachers the least likely (English: 99% vs. math: 53%). Similarly, English teachers were at the high end when it came to discussing "the concepts of fair use and copyright" with classes, whereas math teachers were at the low end (English: 83% vs. math 50%) (Purcell, Buchanan, & Friedrich, 2013).

However, Müller et al.'s (2006) study about teaching practices with digital media undertaken in Germany, in which video recordings were used of each time one lesson of a purposefully selected sample of grade 11 and 12 teachers, 20 altogether (12 math teachers, eight German and computer teachers), found no differences between the group of math educators as compared to the group of those teaching the other subjects. The three types of ICT teaching scripts, teacher-oriented, student-oriented, and a mixture of both, were used by participants from the two groups. The researchers described the fact that the group of non-math teachers was composed of German and computer teachers as a possible explanation for this unexpected finding; teachers of these two subjects may be too different or computer and math teachers more similar than the researchers had expected at the beginning of the study (Müller, Blömeke, & Eichler, 2006).

Length of teaching

Various researchers reported that the teachers' age or the number of years they have been teaching shape their conceptions or practices of information literacy teaching. Regarding teachers' self-assessment of their information literacy teaching, the school library impact study in Idaho showed that those who were newer to the profession in terms of "year of highest degree" and year of first employment in K-12 education were more likely to rate their solo teaching of "social responsibility" as "excellent" or "good" (Lance, Rodney, & Schwarz,

2010); the Indiana study did not collect data about the educators' length of teaching experience (Lance, Rodney, & Russell, 2007). The German BITKOM study found that younger teachers were more likely to hold a "positive" or "rather positive" attitude towards the use of electronic media in their teaching ("up to 40": 83%; "41-50": 86%; "older than 50": 62%). Younger teachers also tended more to "agree" and "rather agree" that the use of computers enhances student motivation ("up to 40": 87%; "41-50": 81%; "older than 50": 61%) and concentration ("up to 40": 78%; "41-50": 82%; "older than 50": 57%) and the speed of learning ("up to 40": 86%; "41-50": 89%; "older than 50": 63%) (Arenz, Huth, & Pfisterer, 2011).

Knowledge domains and to a lesser extent the length of teaching experience seem to shape aspects regarding teachers' conceptions and practices of information literacy teaching. The next subsection reports studies about teachers and collaboration.

2.3.3 Teachers and Collaboration with the SL in IL Teaching

This subsection reviews research about teachers' conceptions and practices of collaboration with the school library and the school librarian. The focus is on collaboration in the context of information literacy teaching. The review begins with results regarding educators' conceptions of the role of the school library and librarian, followed by studies dealing with other teachers' conceptions about other aspects of collaboration. Then Montiel-Overall's important research about the development and refinement of a theory of collaboration is described. Afterwards studies about teachers' collaborative activities with the library are reviewed, first those presenting reports of librarians about teachers, then those presenting reports from teachers and librarians, and finally those presenting reports from teachers. The subsection concludes with a review of intervening conditions that shape teachers' library-related conceptions and practices.

2.3.3.1 Conceptions of the role of the school librarian

In their phenomenographic study about teachers' conceptions of student information literacy with teachers from nine different schools in the UK Williams and Wavell (2006a) found that teachers' views of the school librarians' roles were partly similar and partly different from school to school. In the majority of schools, the librarian was perceived as a provider of resources and help to students in the context of research tasks whereas there was no unanimity about the role of the librarian as a provider of professional development for teachers and as

interdisciplinary coordinator of information literacy. The researchers concluded that differences in conceptions might be due to differences in the qualification of school librarians and teachers' past experiences with librarians. Educators' conceptions of the role of the school librarian tend to be part of (state-wide) school library impact studies. Results of several recent ones are reported here. First, results from studies that investigated correlations between aspects of the school library program and student learning in the form of test scores are reported, then results from studies that investigated the impact of the school library on student learning in other forms than standardized tests

School library impact studies in Indiana, Idaho, and Pennsylvania

Numerous studies for investigating correlations between aspects of the school library program and student learning in the form of test scores have been undertaken by Lance. In the three studies with procedures similar to each other conducted by Lance together with other researchers in Indiana (in 2006), Idaho (in 2009), and Pennsylvania (2011), teachers (Indiana study, N=422; Idaho study, N=668; Pennsylvania study, N=950) were asked in predominantly quantitative surveys about their conceptions of the librarian's role in their school. Table 2-6 compares the results.

Table 2-6: Teachers' Conceptions of the School Librarian's Role (Indiana, Idaho, Pennsylvania)

	Indiana (N=422)	**Idaho** (N=688)	**Pennsylvania** (N=950)
Instructional support	86.3%	86.1%	61.8%
Reading motivator	79.9%	79.6%	71.1%
Teacher	75.4%	62.7%	75.9%
Curricular/instructional resources manager	68.5%	57.5%	75.9%
Provider of in-service professional development	51.2%	27.7%	38.9%
School leader	49.3%	39.8%	39.1%
Computer manager	41.0%	/	/
Technology instructor	/	27.4%	45.2%
Technology troubleshooter	/	26.9%	38.8%
Curriculum designer	23.2%	10.2%	30.6%
Co-teacher	/	/	61.7%

Note. / = No data collected about this item; sources: Lance, Rodney, and Russell (2007, p. 106); Lance, Rodney, and Schwarz (2010, p. 43); Lance and Schwarz (2012, p. 78)

The four most-mentioned roles were the same in the three studies although their rank order was different in the Pennsylvania study: ranked first and second in Indiana and Idaho were "instructional support" and "reading motivator"; ranked first in Pennsylvania with the same percentage of educators (each time 75.9%) holding these conceptions were "teacher" and the

traditional role of a "curricular/instructional resources manager", the latter was mentioned also by close to 70% of participants in Indiana and close to 60% of participants in Idaho. More differences were found with regard to other perceived roles. The conception of the librarian as a provider of in-service professional development was held by slightly more than half of educators in Indiana, close to 40% in Pennsylvania, and only slightly more than one-fourth in Idaho; that of the librarian as a "school leader" was recognized by almost 50% of teachers in Indiana but only by almost 40% in Idaho and Pennsylvania. With regard to information technology, items were different in the Indiana study, where 41.0% considered the librarian as a "computer manager". Considerably more teachers in Pennsylvania than in Idaho saw the librarian as a "technology instructor" and as a "technology troubleshooter". In the three studies, the librarian's role as a "curriculum designer" was among the least mentioned: it was held in Pennsylvania by 30%, in Indiana by almost a quarter of participants but in Idaho only by every tenth educator. The item about the role of the librarian as a "co-teacher" was only used in Pennsylvania and held by slightly more than 60% of educators (Lance, Rodney, & Russell, 2007; Lance, Rodney, & Schwarz, 2010; Lance & Schwarz, 2012).

As mentioned above, the main aim of these predominantly quantitatively oriented school library impact studies was to investigate the relationship or correlation between various components of the school library program and student achievement. A major criticism that has been brought forward about them is that they do not allow the identification of any cause-effect relationship (Eisenberg, 2004). Lance counters by arguing that he and his fellow researchers control for competing causes in a scientifically sound manner (Achterman, 2007): along with bivariate correlation analysis, they also utilize partial correlation analysis where they control for the demographic variables of poverty and race/ethnity (Lance, Rodney, & Russell, 2007). The researchers found correlations between teachers' conceptions of the librarian's roles and student achievement in all three studies, but detailed results were only provided in the reports of the Indiana and Idaho study. In the Indiana study, student achievement was expressed through the scores achieved by elementary school (grade 3), middle school (grade 7), and high school students (grade 10) in ISTEP+ (Indiana Statewide Testing for Educational Progress-Plus) for reading/language arts, mathematics, or both in fall 2005. In the Idaho study, student performance was expressed in terms of percentages of students in grades 3, 4, and 5 (elementary school), grades 7 and 8 (middle school), grade 10 (high school) who earned advanced scores on the Idaho Standards Achievement Test (ISAT)

for reading and language arts in 2009. The researchers found the following statistically significant relationships:

> In Indiana, at elementary level, when teachers perceived of librarians as “teacher” and “curriculum designer” students earned better scores. At middle school level, better student achievement correlated with educators’ conceptions of the librarian as an “instructional resources manager”. No statistically significant relationships were found for the high school level (Lance, Rodney, & Schwarz, 2010).
>
> In Idaho, in elementary school, student achievement in language arts tests was negatively related to teachers’ conceptions of librarians as “technology instructors", students scored higher when fewer teachers perceived of librarians in this role. At middle school, scores in both tests were higher when librarians were more often perceived as “instructional support”, “in-service professional development provider” and only language arts scores were better with the conceptions of librarians as “web site manager“. More high school students had better results in both tests when more teachers perceived of librarians as “curricular/instructional resources managers”, “technology troubleshooters“, and “technology instructors“ (Lance, Rodney, & Schwarz, 2010).

In the impact studies at Indiana and Idaho, teachers were also asked both to qualify their teaching of ICT standards when teaching alone (as reported in section 2.3.2.) and when teaching together with the librarian. They considered their teaching of all three strands as better when teaching together with the librarian; percentages of teachers who qualified the collaborative teaching as “excellent” or “good” were as follows:

> In the Indiana study (N=422): for “Information Literacy”, 91.7% (vs. 79.5% when teaching alone); for “independent learning”, 90.8% (vs. 78.7%); and for “social responsibility”, 87.3% (vs. 73.1%) (Lance, Rodney, & Russell, 2007).
>
> In the Idaho study (N=668): for “ICT Literacy”, 88.7% (vs. 69.7% when teaching alone); for “Independent Learning” 90% (vs. 77.1%); and for “Social Responsibility”, 86.6% (vs. 73.7%) (Lance, Rodney, & Schwarz, 2010).

Researchers also found a relationship between student performance and teachers’ self-assessment of information literacy or ICT teaching when teaching alone or with the librarian:

In Indiana, elementary school students scored better when teachers qualified their teaching of "information literacy" and "social responsibility" together with the librarian as "excellent" or "good" (as opposed to "fair and "poor"). Results for the other two grade levels were not statistically significant (Lance, Rodney, & Russell, 2007).

In Idaho, at the elementary school level, the relationship was again negative: more students had better scores in both tests when teachers qualified the collaborative teaching of "social responsibility" as less than "excellent". At the middle school level, student achievement was higher when teachers assessed their teaching of "ICT literacy" and of "independent learning" together with the librarian as "excellent". At the high school level, more students had better scores when teachers qualified their solo teaching of "social responsibility" as "excellent" (Lance, Rodney, & Schwarz, 2010).

Different in the Pennsylvania study survey was a question asking teachers about the desirability of ten "potential components of a statewide school library infrastructure". Considered as "essential" and "highly desirable" by the highest number of teachers were a "certified librarian (with school librarian certification) in every school" (97.7%), "state-negotiated and acquired collection of electronic/digital resources to support a 21st Century Skills curriculum (e.g., databases, e-books)" (87.8%), and "professional development supporting collaborative teaching of 21st Century Skills for librarians and teachers" (85.6%). Another important result was that a "state-mandated and assessed 21st Century Skills curriculum for which librarians are responsible" was perceived as "essential" and "highly desirable" by only 66.4% of educators (Lance & Schwarz, 2012).

School library impact studies in Ohio, Delaware, and Wisconsin

Other US impact studies were carried out in order to investigate how school libraries have an impact on student learning in another form than standardized tests. They were initiated by Todd and Kuhlthau in Ohio (2003), repeated by Todd and Heinström in Delaware (2004-2006), and by Smith in Wisconsin (2005). All of them collected data from faculty as one group of participants.

In the two studies undertaken by Todd and his colleagues (Todd & Kuhlthau, 2005b; Todd & Heinström, 2006b; Todd & Heinström, 2006a), an online survey was administered to faculty.

For this part of the study, in both states, only schools that were considered by external professional experts and based on empirically developed criteria to have "highly effective school libraries" were invited to participate. In Ohio 879 faculty members from 39 schools and in Delaware 468 from 13 schools participated. In both studies, the majority of the sample consisted of teachers (Ohio: 88.4%; Delaware: 90.4%), in addition to school librarians, principals, and technology specialists. Results were not reported for teachers separately, but given that each time about nine out of ten participants were educators, these studies are taken into account here. Only for the Delaware study repartition of faculty among school types was reported: 26% came from an elementary school, 43% from a middle school, and 30% from a high school (Todd & Heinström, 2006b). Based on findings and experiences in Ohio, the online survey was revised for Delaware, including changes in terminology, adding and deleting questions, and adding a "No Help category". Both online surveys asked participants to express their degree of agreement with statements (48 in Ohio and 50 in Delaware) about the library helping students "with their learning in and out school", organized around seven concepts, and to answer an open-ended item. This "critical incident question" changed from one in Ohio that invited faculty to describe outcomes of the help provided by librarians, for example, improvements in students' products, to one in Delaware that invited participants to report both student outcomes and underlying pedagogical activities provided by librarians. The results for the quantitative part of the surveys were as follows:

> In the two studies, almost all faculty members (Ohio: 99.77%; Delaware: 99.82%) thought the library had helped students with their learning in some way or other, regardless of the degree of help.
>
> Out of all statements the following three were perceived as helpful, regardless the degree of helpfulness, by the highest number of participants: Ranked first in Ohio was the statement "Computers have helped students find information inside and outside of the school library" (98.1%) and in Delaware the statement "The school library has helped students find different sources of information for their topics (such as books, magazines, CDs, websites, videos)" (95.9%). Ranked second in both studies was the statement "Computers in the school library have helped students do their school work better" (Ohio: 97.7%; Delaware: 95.7%). Mentioned by 97.7% of faculty in Ohio and ranked third in Delaware (95.5%) was the statement "The school library has helped students learn a lot more facts about their topics".

> Comparative analysis of means for the seven conceptual blocks (Table 2-7) showed that the school library was considered by faculty in both studies as most helpful for students with "using computers" (Block 4), and then with "getting information" (Block 1). Ranked third in Ohio was helping students with "using information" (Block 2), which came fourth in Delaware, where "reading" (Block 4) was ranked third, which came fourth in Ohio. In both studies faculty perceived of the library as being less helpful for students with achieving better in projects and tests (Block 7) (Ohio: 5; Delaware: 6), with the development of subject knowledge (Block 3) (Ohio: 6; Delaware: 4), and as least helpful with regard to "independent learning" (Block 6) (Rank 7 in Ohio and Delaware).

In the qualitative part of the Ohio study, the researchers found six types of statements about the helpfulness of the school library for students. Mentioned by the highest number of participants (179) were "quality products", for example, "improvement in product content", and "improved writing skills"; mentioned second most (138) were aspects related to students' "research agency", for example, "improved information seeking" and "improved information use"; and ranked third were "information technology capability" (93). In the Delaware study, qualitative findings were reported differently. The researchers found statements about the types of help described in the seven categories of the survey although they did not mention the number of participants who expressed it as they did for the Ohio study. However, they noted:

> The faculty value the role of the school librarian as an instructor, especially in terms of research, information access and information seeking, and enhancing students' reading skills. The school librarian's role in terms of knowledge construction through information was less strongly supported. (Todd & Heinström, 2006a, p. 13)

In addition to statements of faculty who found that the library was of no help to students, they identified several new forms of help: "school librarians" in terms of providing pedagogical interventions and collaborating with teachers; the "school library as a place", for students to work or for particular events; enhancing "students' personal development", that is, their motivation and independent learning abilities; "preparation for standardized tests"; "providing different types of knowledge representation and experience", for example, access to particular subject-related software; and "involving parents/families in student learning". As far as working with the librarian is concerned, the majority of faculty perceived of the librarian as a provider of resources and a teaching support (cooperation) rather than an equal partner in the teaching process, with whom they collaboratively prepare, assign, and supervise learning activities (collaboration).

In Wisconsin, Smith (2006a) replicated the Ohio study with a different goal, the investigation of the impact of all kind of public school libraries on student learning, so that schools were selected through random quota sampling. From the 75 schools who were invited, 51 participated, and within these schools, as far as staff members are concerned, only teachers took part (107 altogether): 40.2% of the teachers were from elementary schools (grade 4), 19.6% from middle or junior high schools (grade 8), and 35.5% from high schools (grade 10), while the others were working in combined schools. The Ohio survey was used in a slightly modified version, including the addition of two new statements and a category called "not at all helpful", and the deletion of the critical incident question.

Results about blocks of statements were reported in ranges of percentages; 57-99% of teachers perceived of the library as helpful in all seven areas, regardless the degree of help, 9-49% as "very helpful" and between 5 and 25% considered it to be of "little help" or "no help".

Of all 50 statements, the five rated as "most helpful" by the highest number of participants were the following: "The school library has helped my students feel better about asking for assistance when they go there" (48.6%); "The school library has helped my students find different sources of information for their research topics" (45.8%); "The school library has helped my students find stories they like" (44.9%); "Computers and technology have helped my students find information inside and outside of the school library" (43.9%); and "Computer programs (like PowerPoint, Word, and Excel) in the school library have helped my students do their school work" (43.9%).

Based on a comparative analysis of the means for the seven conceptual blocks and the ranking that emerged out of it, the results of the Wisconsin study are compared to the results of the studies in Ohio and Delaware in Table 2-7. It shows that in Wisconsin, faculty perceived of the school library as most helpful for students with "getting information" and then with "using computers"; these were also the two areas in which the library was considered as particularly helpful for students by faculties in Ohio and Delaware, although in these two studies the order was inversed. "Reading" came third in Wisconsin and "using information" fourth, just as in Delaware.

Table 2-7: Ranks of Blocks of Statements from Faculty about Helpfulness of School Library (Ohio, Delaware, Wisconsin)

Blocks	Ohio (N=879)	Delaware (N=468)	Wisconsin (N=107)
Block 1: getting information	2	2	1
Block 2: using information	3	4	4
Block 3: knowledge	6	5	5
Block 4: using computers	1	1	2
Block 5: general reading interests	4	3	3
Block 6: independent learning (outside school)	7	7	7
Block 7: academic achievement	5	6	6

Note. Sources: Todd and Kuhlthau (2005b, p. 96); Todd (2005b, p. 251); Todd & Heinström (2006a, p. 8); Smith (2006a, p. 42)

The three areas for which the library was perceived as least helpful were the same in all studies: In Wisconsin and Delaware, the library helping with the development of subject knowledge came fifth, being helpful with "academic achievement" came sixth, the order was inversed in Ohio, and the library helping with "independent learning" came last in all three studies.

Other school library impact studies: Scotland, New York, New Jersey

The school library impact study undertaken by Williams and Wavell in Scotland (UK) in 1999-2001 used a qualitative approach and investigated, among others, educators' conceptions of the contribution of the school library to student learning. Teachers from ten secondary schools participated in semi-structured focus group discussions. Schools were selected according to the following criteria: schools considering their school library program as meeting Scottish standards; the willingness of librarians, administrators, and teachers to participate; geographical spread but also logistics; and diversity in school characteristics. Teachers within the schools were invited either by librarians or senior management; between four and ten per school participated, covering a broad variety of subjects. Teachers who participated in focus group discussions thought that the library plays a role in providing information for research tasks assigned by subject teachers; it can help students with developing library, information and reading skills; it provides adequate material for reading;

working in the library, especially on computers, enhances student motivation; it can foster independent learning; it is an interdisciplinary place; and it plays a social role in offering access to resources, information technology, and skills development to all students. The two researchers also studied teachers' conceptions of the librarian's role. They found that

> The librarian was seen as having a role in supporting teaching; finding and supplying resources; supporting teachers in their learning, especially ICT skills; supporting pupil use of all resources; a role of central maintenance and distribution of information within the school and being prepared to participate in activities beyond the call of duty. (Williams & Wavell, 2001b, p. 23)

In the state of New York an impact study was undertaken in public schools in 3 phases from 2006 to 2008. A survey was administered in the second phase to teachers as one group of participants. School librarians from 47 schools, among them 23 from libraries that had been qualified as "exemplary" by the administrators responsible for school library systems across New York State according to the School Library Program Evaluation criteria, had been asked to invite teachers; 134 responded positively, from 0 to 15 per school. The majority (99) were teaching at secondary level, that is, middle and high school, 30 at the elementary level, and five had teaching assignments at both levels. Teachers were asked to rate ten items "from 10 (most important) to 1 (least important)" describing services offered by the school librarian. Most important for teachers were the more traditional activities: they ranked "motivating students to read" highest (10), then "providing information resources for teachers and students" (9) and "maintaining a neat and orderly collection" (8). The item related to teacher-librarian collaboration for information literacy teaching ("working with teachers to teach research skills to students") was ranked low (4), as was the item that dealt with the ethical use of information, "writing and enforcing policies on copyright and appropriate Internet use", which was ranked the third lowest. However, librarians "helping students use computers responsibly" was considered as more important (6). These quantitative results were confirmed by findings from an open-ended "critical incident short-answer question", similar to that used in Todd et al.'s (2005b) Ohio study, in which survey participants were invited "to recount a time when they observed the SLMS help their student learn something or excite their students about learning something". The most mentioned activities were librarians helping students with gathering information for a particular project, with using computers for information location but also organization and presentation, and teaching students about information finding in different formats (Small & Snyder, 2009).

In another state-wide study about the impact of the library on student learning, undertaken in New Jersey (2009-2011), Todd and his colleagues opted for a different approach than in Ohio and Delaware. Instead of a survey, they used semi-structured focus group discussions for collecting data in the form of "narrative stories" from faculty of 12 schools with "effective school libraries". Each school was invited to compose a focus group consisting of six to eight members: the principal, the school librarian, the curriculum head, three subject teachers who were experienced in working with their school librarian, and specialized teachers. Taken all schools together, 97 people participated, including 49% teachers and 22% librarians. The aim of the study was not to investigate teachers' conceptions in particular, and as they represent only about half of participants, findings are reported only briefly here. Faculties described their library as a "pedagogical center" that is an extension of classrooms, where the librarian acts as a "co-teacher", heavily relying together with teachers on a pedagogical approach that is inquiry-based. In terms of learning, the researchers identified six types of capabilities that school librarians help students to develop: "resource-based", "knowledge-based", "reading-to-learn", "thinking-based", "learning management", and "personal and interpersonal" (Todd, Gordon, & Lu, 2011).

In summary, investigations about teachers' conceptions of the role of the library and librarian, which were undertaken especially in the context of state-wide library impact studies in the USA, showed that teachers tend to consider the librarian as a provider of resources and a support for their teaching rather than a co-teacher. Also, they perceived him as more helpful for students with computer use and information finding than with aspects related to knowledge building and independent learning. It should be noted that in the majority of these studies teachers who participated were experienced in interacting with librarians.

2.3.3.2 Other studies about teachers' conceptions

Teachers' conceptions regarding their collaboration with the school library or librarian also were part of other studies than those about the impact of the school library on student learning and these studies dealt also with other aspects than teachers' conceptions of the role of the school library or librarian.

An earlier Australian study in a secondary school about the implementation of integrated information literacy teaching reported four "levels of commitment" in the faculty: resistance, that is, teachers who considered working with the school librarian as bearing too many risks

and taking too much time; curiosity, that is, recognizing the worth of integrated information literacy instruction without being ready to participate and to have a second staff member in their classroom; acceptance, as experienced by those teachers who worked with librarians and talked about their successful experiences to their colleagues but were still worried about not having enough time to cover subject content; and finally, those who were totally committed (Lamb & Todd, 1994).

A small case study in a US high school, which investigated educators' influence on their students' use of electronic resources in the school library, in which 67% of teachers (N=164) from 15 departments completed an online survey with mainly Likert-type and two open-ended questions showed that most teachers were "not familiar" with the school's databases (54-83%, depending on the database). When they were asked what they think about databases as compared to the internet as information resources, more than half of participants thought that databases contain "more reliable information" (53.0%) or "more focused information" (52.4%), 26.4% thought that the internet provided the "faster response", 50.9% were not sure, and 6.7% found no difference; 31.9% of teachers considered the internet as easier to use (vs. databases: 17.8%) and slightly more than one-third found that the internet had advantages in terms of "greater scope of information" (34.8%) and "more current information" (34.4%), but here again, important numbers of teachers did not know (regarding "greater scope of information", 40.9% and regarding "more current information", 45.4%). Teachers appreciated the internet for student learning: each time the majority considered it as "good" or "excellent" for "special reports or projects" (91%), for the information needed in a "teachable moment" (85%), and for "homework assignments" (71%). In the qualitative part, the researchers found that the majority of teachers held positive conceptions of the internet and valued it as a resource for classroom assignments (Williams, Grimble, & Irwin, 2004).

In the context of the Kent State University (Ohio) Institute for Library and Information Literacy Education (ILILE) program, 170 teacher-librarian partnerships (340 participants) were established from 2002-2005. Their "dynamics" were investigated through a web-based questionnaire with mostly open-ended questions completed by 130 participants (65% school librarians and 35% teachers), and seven follow-up phone interviews. The majority of collaborations, which integrated information literacy competencies with content standards in a wide range of assignments, involved students from grade 6 to 12 in a variety of subject areas. Findings regarding conceptions were reported separately for teachers and librarians; findings for teachers were as follows (each time the two most reported are listed here):

The most reported strength of the collaborative teaching as reported by educators was the “team approach, connecting two areas of expertise” (42% out of 43 strengths identified) and second, “better access to/use of relevant resources or easier to match relevant resources to the teachers need” (12%). When asked what they had been able to do with the librarian that they could not have done without him, teachers referred first to “better information literacy education for the students, access to resources” (44% out of 34 identified) and then to “instructional benefit, team teaching, plan and prepare more efficiently, cover more material in a short time” (33%).

There were differences between teachers’ conceptions of expected gains and actual gains from their collaborations with school librarians. When they were asked what they hoped their students would “gain” through the collaborative interactions (total gains identified: 57) they mentioned learning of subject content (28%) first and almost to the same extent “information skills, research, IL” (26%). But when they were asked about the actual impact of the collaboration on students, information literacy learning was the by far most mentioned (61% out of 43 impacts identified) as opposed to learning subject knowledge (37%). Similarly, they also hoped to make gain in the first place in their teaching of subject content, that is “improved pedagogy, content knowledge, better understanding of curriculum” (55% out of 47 gains identified) and in the second place to profit regarding aspects related to the library and librarian, that is “resources, technology help or support from librarian, that librarian would better understand the teachers needs” (26%). But they described as major outcomes for themselves aspects related to the interaction with librarians, that is “stronger belief, stronger understanding in collaboration” (40%) and then only second aspects related to their teaching of subject content, that is, “professional skills, teaching skills, information literacy, refining practice, instructional planning (overall not related to collaboration)” (31%).

According to teachers, the collaboration changed their “normal professional routines” especially in terms of “improved relations, understanding of partners aim and tasks” (51% out of 45 changes identified) and to a lesser degree also their “work routines, started to plan more, worked in other location for project” (24%) (Todd & Heinström, 2008).

This subsection reported results from smaller studies and a more encompassing one that addressed different aspects of collaboration from teachers' perspectives. The next subsection reports research about the development of a theory of librarian-teacher interaction.

2.3.3.3 Montiel-Overall's theory of collaboration

Based on the literature in education as well as in information and library science and especially Loertscher's (2000) taxonomies for librarians and teachers, Montiel-Overall began to develop "a theory of collaboration for teachers and librarians" (Montiel-Overall, 2005b; Montiel-Overall, 2005a) that was tested and refined in various studies with teachers as the major group of participants. At the beginning, she distinguished four separate "models" of teacher-librarian collaboration (Montiel-Overall, 2005b; Montiel-Overall, 2005a):

> *Model A: Coordination:* Informal type of interaction; low levels of commitment required; major aim is efficiency; not necessarily related to student learning; one participant acting as main coordinator;
>
> *Model B: Cooperation*: Closer relationship; similar or joint goals; division of tasks; related to student activities; one participant may act as leader; librarian considered and acting as a support for the teacher;
>
> *Model C: Integrated Instruction:* Thinking, planning, and creating something new together; requires more commitment and trust; integration of library with subject curriculum; aim is improving student learning; librarian considered and acting as a co-teacher;
>
> *Model D: Integrated Curriculum*: Integrated instruction in the entire school, with all subject areas.

The theory was confirmed and refined in later research. In a study using two quantitative surveys completed by 64 teachers, seven librarians, and seven principals from seven public schools (covering altogether Pre-K to grade 8) in a large urban district in the USA, Montiel-Overall found three types of practices: "integrated instruction", "library and librarian as resource" in the form of coordination and cooperation, and the "traditional role for teacher and librarian" (Montiel-Overall, 2007). From a qualitative study in three best practice school libraries (covering altogether Pre-K to grade 8) with librarians (N=3) and teachers (N=15)

experienced in working together, using semi-structured interviews, observations, and final group discussions as data collection techniques, she concluded that her theory needed revision. In "high-end collaborations", that seek to have an effect on student learning in terms of subject content as well as information literacy, all four forms of interaction, coordination, cooperation, integrated instruction, and integrated curriculum, are needed and should be seen as "facets" rather than isolated "models". However, the facets may appear separately in schools with lower levels of teacher-librarian interactions and serve as intermediate steps towards high-level collaboration (Montiel-Overall, 2008). In another quantitative study using a survey approach, with 194 elementary teachers from 11 schools with full-time librarians who had at least five years of experience in two districts, the four facets were confirmed (Montiel-Overall, 2009).

The next subsection reviews and discusses more research about practices of teacher-librarian collaboration, first, studies that predominantly report the perspective of school librarians, followed by studies that report the perspective of teachers as compared to the perspective of librarians, and finally studies about teachers' perspective.

2.3.3.4 Practices as reported by school librarians

Several state-wide US studies presented frequencies of three types of teacher-librarian interaction as reported by librarians, using partly different terms and definitions than Montiel-Overall: working together rather informally, in the form of "cooperations", or in the more formal ways of "coordinations", where part of the planning happens together and the actual teaching is done independently, or "collaborations", where planning and teaching are discussed and occur together (Todd, 2005b).

In the first phase of the Delaware study undertaken by Todd et al., librarians from almost all of the state's public schools (N=154; 91 elementary, 31 middle, 30 high schools and 2 combined) completed an online survey about the school library and its services. One of the crucial results was that school librarians reported about working with teachers in the form of "cooperations" in the first place, then in "coordinations", and to a lesser extent in the form of collaborations. The researchers reported frequencies of teacher-librarian interactions for the school year that preceded the study and for four knowledge domains: English language arts, social studies, science, and mathematics. Percentages of school librarians who reported cooperations, regardless the frequency, varied from 57% (with math teachers) to 90% (with

English teachers), those reported for coordinations varied from 25% (with math teachers) to 71% (with English teachers), and those for collaborations from 11% (with math teachers) to 40% (with English teachers) (Todd, 2005b).

Other studies also found cooperations being the predominant type of librarian–teacher interaction. The New Jersey study, which took place several years later, in 2009, in which data were collected from 30% of the state's schools (N=765; 97% public and 3% private schools) found the following average numbers for instructional interactions between librarians and teachers in the school year preceding the study: 27 cooperations, 15 coordinations, and 5 collaborations per librarian (Todd, Gordon, & Lu, 2010; Todd, 2012). In the qualitative third phase of the New York study Small et al. conducted interviews with librarians and principals as well as focus group discussions with teachers, students and parents in ten schools, and in two of the schools (an elementary and a middle school) considered as "exemplary" also ethnographic research in the form of observations over 10 weeks (90 hours) and interviews with the principals, librarians, and four teachers were also undertaken. They found that the interaction of librarians and teachers "falls along a continuum from simple resource provision to total design, delivery, and evaluation of instruction" (p. 13). They identified only a limited number of collaborations where the librarian and teacher acted as co-teachers, but found in one of the schools that a principal decided to institutionalize this type of interaction (Small, Shanahan, & Stasak, 2010).

Both quantitative and qualitative parts of the impact studies revealed that librarians worked predominantly through informal cooperations with teachers, then through the slightly more formal coordinations, where still an important amount of independence was kept, and to a much lesser extent through collaborations, which required a higher level of commitment and where both acted as co-teachers.

2.3.3.5 Practices as reported by school librarians and teachers

Other studies collected data from both librarians and teachers about particular collaborative activities. For example, in the predominantly quantitative surveys administered in the context of the school library impact studies in Indiana (in 2006), Idaho (in 2009), and Pennsylvania (2011), librarians and teachers were asked about the frequency of particular library-related interactions (Lance, Rodney, & Russell, 2007; Lance, Rodney, & Schwarz, 2010; Lance & Schwarz, 2012). Respondents were not selected randomly, that is, school librarians were

invited by state library associations to participate and asked to nominate up to five teachers with whom they had been collaborating closely; samples of librarians were as follows: Indiana: N=293; Pennsylvania: N=597; for Idaho results are reported here only for the group of certified librarians not for that of library aides, so that N=146. Teacher samples for the three states were for Indiana: N=422; for Idaho: N=668; and for Pennsylvania: N=950.

Class visits to the library

Results from librarians: Librarians reported that teachers tend to visit the library on a fixed schedule on a weekly basis (Indiana: 56.3% of librarians; Idaho: 58.9%) and that more than one-third (Indiana: 36.5%) or one quarter (Idaho: 27.4%) of teachers does it seldom or not at all. The item was not included in the Pennsylvania study. In the two first mentioned studies more librarians noted that teachers bring classes to the library on a flexible schedule "at least weekly" (Indiana: 67.9%; Idaho: 76.7%) and in Pennsylvania also an important number reported this activity (63.8%); and less participants reported about it taking place seldom or not at all (Indiana: 11.3%: Idaho: 2.1%; Pennsylvania: 19.3%). Differences were found for teachers accompanying classes to the library: in the three studies it was reported mainly as occurring "at least weekly" but by considerably more librarians in Indiana (70.3%) than in Idaho (49.3%) and Pennsylvania (52.8%); consistently, considerably less librarians reported about teachers doing it "rarely or never" in Indiana (16.0%) than in Idaho (32.2%) and Pennsylvania (28.9%).

Results from teachers: They were most likely to go to the library on a fixed schedule "at least weekly" (Indiana: 42.2%; Idaho: 44.5%). However, each time more than one quarter reported about engaging in this activity "rarely/never" (Indiana: 28.0%; Idaho: 26.9%). The item was again not included in the Pennsylvania study. Teachers reported that their "classes and/or students visit the library on a flexible schedule" in the first place "at least monthly" in Indiana (32.0%) and Idaho (29.2%); or "at least once a semester" in Pennsylvania (28.5%). The percentages of teachers reporting "rarely/never" for this activity ranged from 14.7% in Indiana and 16.3% in Idaho to 21.5% in Pennsylvania. Teachers tend to accompany their classes to the library "at least weekly" in Indiana (28.9%), but in Idaho and Pennsylvania "at least monthly"

(23.1%; 24.6%) and "at least once per semester" (22.0%; 25.1%). Not or seldom accompanying students to the library was reported by 15.9% of educators in Indiana, 32.8% in Idaho and 22.1% in Pennsylvania.

Similarities and differences between librarians and teachers: A comparison of the results from the two groups shows that teachers tend to visit the library on a fixed schedule on a weekly basis and that important numbers of teachers do not do it at all. Both, librarians and teachers reported flexible visits as being more likely to take place than fixed, regardless the frequency, but librarians described flexible visits as occurring more often than teachers did. In two of the studies librarians also claimed that teachers accompany classes more often to the library than educators themselves.

Librarian being invited to classroom

Librarians: In all three studies, invitations to the classroom were reported by librarians predominantly as taking place seldom or not at all, although by less participants in Indiana (34.8%) than in Idaho (46.6%) and Pennsylvania (45.8%).

Teachers: In all three studies, inviting the librarian to the classroom was the activity for which the highest numbers of participants said that they do it "rarely/never"; it was most reported in Idaho (61.3%), then in Indiana (52.1%) and less in Pennsylvania (44.8%).

Similarities and differences between librarians and teachers: Although the percentages of participants varied considerably within both groups from study to study, it was identified by both as the activity that was most likely to occur seldom or not at all.

Providing resources for instructional purposes

Librarians: Both the librarian providing resources to teachers for instructional purposes and teachers asking for such sources was reported by librarians as happening predominantly on a weekly (Indiana: 49.1% and 38.9%; Idaho: 37.0% and 35.6%) and monthly basis (Indiana: 32.1% and 38.6%; Idaho: 37.7% and 38.4%). In Indiana, these were the two activities that were reported

as happening "rarely/never" by the lowest number of librarians; in Idaho, they came second and third lowest. The two items were not reported for the Pennsylvania survey.

Teachers: Both the librarian proactively suggesting resources and the teacher asking for them predominantly occur "at least monthly" (Indiana: 39.7% and 37.4%; Idaho: 40.3% and 37.1%). In both studies they were the activities that were reported as happening "rarely/never" by the lowest numbers of educators. The two items were not reported for the Pennsylvania survey.

Similarities and differences between librarians and teachers: The traditional activity of providing resources to teachers for instructional purposes, either proactively or on the teacher's request, were the most reported, regardless of the frequency, by teachers in both states and by librarians in Indiana; Idaho librarians mentioned it as the activities happening second and third most. Librarians in the two states reported it, regardless who took the initiative, as happening more often than teachers.

Collaboration on instruction

Librarians: Librarians initiating collaboration was reported in Indiana predominantly as taking place on a monthly basis (32.8%), and in Idaho each time almost by one quarter of librarians reported as happening "at least monthly" (24.7%) or "at least once per semester" (24.0%). Teachers initiating collaboration was reported in Indiana especially as taking place on a monthly basis (31.7%) and in Idaho on a semester basis (30.1%). Rare or no initiation of collaboration from the librarian's side was reported in Indiana by 14% and in Idaho by more than the double (30.1%); no initiation from the teacher's side was reported by more librarians in Indiana (22.9%) and Idaho (32.9%). The concept of "initiation" was given up and the two items were combined to a single one in the Pennsylvania study; "collaboration on instruction" was said by librarians to occur predominantly on a monthly (23.0%) and semester basis (23.0%); 19.3% reported that it occurs seldom or not at all.

Teachers: In Indiana, collaboration for instructional purposes initiated by the librarian was reported by almost the same numbers of teachers as happening

"at least monthly" (24.2%), "at least once per semester" (24.4%), and "never/rarely" (24.6%), whereas in Idaho almost half of educators (48.1%) noted that it occurs seldom or not at all. Also in Idaho, an important number of teachers (45%) reported that they initiated collaboration "rarely/never", whereas in Indiana 30.3% stated that they do it "at least once per semester" and only about one quarter (24.2%) reported that they do it "rarely/never". In Pennsylvania, 31.0% of teachers reported about collaborating on instruction with the librarian "at least once a semester", 26.2% "at least annually", and almost one-fifth (19.2%) "rarely or never".

Similarities and differences between librarians and teachers: There are considerable differences between states: results from librarians and teachers showed that collaboration is the least likely to take place in Idaho. Results are consistent within states and again, librarians reported a higher frequency than teachers.

Information skills training

Librarians: Another item that was changed in the Pennsylvania study was that about librarians helping educators to learn new information skills. In Pennsylvania, it was the activity that was reported as taking place at all, regardless of the frequency, by the highest number of librarians (90.2%). In the other two studies, it was split in two items, which were not the most reported ones in these studies. Educators taking the initiative and asking the librarian for help in learning about information skills was said to occur at all by 89.4% of librarians in Indiana and 82.9% in Idaho, and librarians offering this help was reported to occur at all by 93.5% in Indiana and by 81.5% in Idaho.

Teachers: In the Pennsylvania study it was the most reported activity, regardless of the frequency (91.7%); not so in the other two studies. Teachers asking the librarian for training was reported as occurring at all by 85.3% of teachers in Indiana and 73.5% in Idaho, and librarians offering training about new information skills was reported by 82.5% in Indiana, and in Idaho, where the item was formulated slightly differently, 69.8% participated in training offered by the librarian.

Similarities and differences between librarians and teachers: In the Indiana study, more educators reported themselves requesting information skills training than opportunities offered by librarians (85.3% vs. 82.5%) whereas more librarians reported offering such training than receiving requests from teachers (93.5% vs. 89.4%). In Idaho, also more teachers reported about asking for training than librarians offering it (73.5% vs. 69.8%), but here also more librarians reported about educators asking for it (82.9% vs. 81.5%). In Pennsylvania, where the item was not split, in both groups of participants it was the most reported activity, regardless of the frequency.

In brief, the comparison of the reports from librarians and teachers about educators' library-related activities in the three studies showed that within each of the three states there were many consistencies between the two groups of participants, but a major difference between the groups was that librarians tended to report higher frequencies. As far as the various activities are concerned, the three studies showed that teachers tended to use the library on a flexible rather than a fixed schedule. In Idaho and Indiana, the two items about the librarian's traditional activity of providing resources to teachers for instructional purposes, either proactively or on the teacher's request, were the most reported with the exception of Idaho librarians who mentioned them second and third. In Pennsylvania, where these items were not used, the most reported activity was the librarian providing information skills training to teachers; in the studies in Idaho and Indiana this item was split in two, one stating that librarians offer it, the other one stating that teachers ask for it. Both of them were reported as occurring at all, regardless of the frequency, by important numbers of participants (69.8% to 93.5%), but in Indiana there were contradictions between librarians and educators regarding the question of initiation. As far as collaborative instruction is concerned, there were considerable differences between states, between 19.2% and 48.1% of teachers stated that it takes place "rarely or never", and between 14% and 32.9% of librarians; according to both groups it was least likely to occur in Idaho. Teachers inviting librarians to their classroom was the activity that was least likely to happen in all three states.

2.3.3.6 Practices as reported by teachers

Other studies investigated predominantly or only practices of collaboration from teachers' perspective. In the Wisconsin study with a random quota sample, teachers (N=107) were asked about the numbers of "collaborative lesson planning" with the librarian in the school

year in which the study took place (data were collected in May, at the end of the school year). On average participants collaborated three times. The majority reported “two – four” (38.3%), each time 11.2% of teachers reported “one” and “five – nine”, and slightly more than one-third (34.6%) reported not engaging in collaborative planning at all (Smith, 2006a).

In the Likert-type part of the survey administered in the context of the small case study about their influence on students use of school library sources in a US high school in which 67% of teachers (N=164) from 15 departments participated it was found that the majority of teachers brings students to the school library 1 to 3 times a school year. Teachers were asked how often they direct students towards particular sources: the most reported frequencies for the “internet” were “sometimes” (39.8%) and “often” (37.9%), for the librarian “sometimes” (37.7”) as well as “never” (22.6%) and “often” (22.0%), for the library catalog they were “sometimes” (39.0%) and “never” (29.6%), for “print reference materials” they were “sometimes” (36.3%) and “never” (31.9%), for “electronic databases” they were “never” (41.8%) and “sometimes” (27.2%), and for “multimedia resources” also “sometimes” (37.9%) and “never” (33.5%). The majority of participants let students decide on the resources they want to use “sometimes” (40.1%) or often (25.3%); the majority “never” tells students “to use print resources before electronic resources” (60.9%), never requires them “to use the internet only” (68.5%), and “never” asks students not to make use of the internet at all (69.5%) (Williams, Grimble, & Irwin, 2004).

Purcell et al. presented a list of sources to teachers in their online survey and asked how likely their students were to use them “in a typical research assignment”. The vast majority (94%) qualified the use of “Google or other general search engines” as “very likely”. Also considered as “very likely” by a majority of teachers were the use of “Wikipedia or other online encyclopedias” (75 %) and the use of “YouTube or other social media sites” (52%). According to teachers, peers also tend to be important to students: 42% stated that their students are “very likely” to use them as sources and 46% “somewhat likely”. Altogether 75% of teachers described the use of “SparkNotes, CliffNotes or other study guides” as “very likely” or “somewhat likely”, 74% the use of “News sites of major news organizations such as the New York Times or CNN”, and 66% the use of “textbooks (either print or electronic)”. Typical library sources were considered to be of less importance. Students seeking help from “a research librarian at [their] school or local public library” was considered as “not too likely” or “not at all likely” by 48% of educators and as “”very likely” by only 16%; similarly, 54% perceived students’ use of “online databases such as EBSCO, JSTOR or Grollier” as “not

too likely" or "not at all likely" and only 17% as "very likely". Even less teachers described the use of "printed books (other than textbooks)" as "very likely" (12%), and half of participants considered it as "not too likely" or "not likely at all". The preference of online sources was confirmed in focus group discussions: teachers mentioned as a reason that students "find it a more interesting and entertaining platform" whereas they consider "other more traditional sources ... as 'boring'" (Purcell et al., 2012).

The study in 11 best practice elementary and secondary schools in Germany in terms of implementation of digital media found that the collaboration of teachers with other teachers in the context of the integration of new media into their teaching occurs in the form of lower level cooperations, for example, "exchange of materials and information", rather than higher level collaborations, for example, projects for which both define goals together and in which they engage over a longer period of time (Eickelmann & Schulz-Zander, 2008).

There are not many studies that deal with collaborative practices exclusively from the teachers' perspective. However, the data that were collected from teachers themselves in the research reported here showed that they tend to work with the librarian 1-3 or 2-4 times per school year. In the context of the implementation of digital media, they work with other teachers in the form of informal cooperations rather than through more in-depth collaborations. Teachers also reported that their students prefer using the internet rather than the databases available in the library. Results about their students' use of the librarian as a resource were contradictory.

2.3.3.7 Intervening conditions

Several studies reported about teachers' conceptions of the library and librarian and their interactions with them being shaped by the school grade level, the knowledge domains they teach, and the length of their teaching experience.

School grade level

For the Indiana impact study (Lance, Rodney, & Russell, 2007), the researchers reported statistically significant differences in teachers conceptions of the librarian's roles and teachers' interactions with the library depending on school grade levels. As far as conceptions are concerned, elementary school teachers were the most likely to consider the librarian as a "teacher" (ES: 82.7%; MS: 70.8%; HS: 66.0%). Educators from middle school were more

likely than their colleagues to perceive of the librarian as a "school leader" (ES: 42.7%; MS: 61.5%; HS: 48.9%). High school teachers were the least likely to regard the librarian as a "curriculum designer" (ES: 29.3%; MS: 27.1%; HS: 14.2%) (Lance, Rodney, & Russell, 2007). Librarians and teachers reported collaborative practices; several results from both groups were similar, while others were contradictory:

Concordance existed that the lower the grade level, the more often teachers go to the library with classes on a fixed schedule; the vast majority of librarians (90.9%) and teachers (90.7%) from the elementary level reported it occurring on a weekly basis (librarians: MS: 58.6%; HS: 15.1%; teachers: MS: 26.0%; HS: 5.0%), whereas 73.3% of librarians and 53.2% of teachers from high school reported it taking place seldom or never (librarians: ES: 6.4%; MS: 35.7%; teachers: ES: 5.3%; MS: 27.1%).

Results from both groups indicated that teachers from the two higher grade levels tend to visit the library on a flexible schedule; however, while teachers reported it as happening especially on a monthly basis (ES: 21.3%; MS: 42.7%; HS: 35.5%) or a semester basis (ES: 16.7%; 31.3%; HS: 30.5%), librarians reported it as taking place predominantly on a weekly basis (ES: 40.9%; MS: 82.9%; 90.7%). Unanimity existed that elementary teachers are the most likely to do it "rarely or never" (librarians: ES: 27.3%; MS: 1.4%; HS: 0%; teachers: ES: 26.7%; MS: 7.3%; HS: 8.5%).

Results from educators themselves showed that teachers from high schools were the least likely to ask the school librarian for instructional resources "at least monthly" (ES: 40.7%; MS: 40.6%; HS: 29.1%); this was not confirmed by librarians (ES: 26.4%; MS: 42.9%; HS: 45.3%). Also not confirmed was that high school teachers were more likely to do it seldom or not at all (ES: 5.3%; MS: 5.2%; HS: 13.5%); if librarians reported this level of frequency, they were most likely to work in elementary schools (ES: 8.2%; MS: 0%; HS: 1.2%).

Found in data from both groups, teachers (ES: 34.0%; MS: 37.5%; HS: 19.9%) and librarians (ES: 19.1%; MS: 24.3%; HS: 17.4%), was that elementary and middle school teachers are more likely to initiate collaboration with the librarian "at least once per semester", but the result from educators that those from high school are more likely to do it "rarely or never" (ES: 24.7%; MS: 14.6%; HS: 34.8%) was not confirmed by librarians (ES: 39.1%; MS: 16.6%; HS:7.0%).

The following three studies about teachers' conceptions of the ways in which the library helps students with their learning also reported differences depending on school grade levels:

In the Delaware study, a comparison of the top ten statements for each school type showed that faculty members from high school found that the library especially helps students with computers, those from middle school that it primarily helps students with information finding, and those from elementary school that it especially helps with reading (Todd & Heinström, 2006b).

In the Wisconsin study, a comparison between grades for the top five statements rated as "most helpful" overall shows considerable differences: "The school library has helped my students feel better about asking for assistance when they go there": ES: 55.8%; MS: 45.4%; HS: 42.9%; "The school library has helped my students find different sources of information for their research topics": ES: 46.5%; MS: 31.8%; HS: 52.4%; "The school library has helped my students find stories they like": ES: 62.8%; MS: 45.4% ; HS: 26.2%; "Computers and technology have helped my students find information inside and outside of the school library": ES: 34.9%; MS: 40.9%; HS: 54.8%; "Computer programs (like PowerPoint, Word, and Excel) in the school library have helped my students do their school work": ES: 25.6%; MS: 40.9%; HS: 64.3%. Analysis of mean scores showed that elementary school teachers considered the library to be most helpful for students in "reading" (middle school: rank 3; high school: rank 6) and then with "using information", whereas middle school teachers and high school teachers found it most helpful for "using computers" (rank 4 in elementary schools) and then for "getting information". Talking in general terms, high school teachers perceived the library as more helpful than their colleagues from the other two school types. The study also found that those teachers who had integrated Information and Technology Literacy Standards (ITLS) into their teaching (51.4%) considered the library as more helpful in all seven areas than teachers who had not (Smith, 2006a).

The study in New Jersey found that in the school year preceding the study, librarians worked with teachers most often in high schools and least often in elementary schools, regardless of the type of interaction. The average numbers per librarian were as follows: for informal cooperation: ES: 14; MS: 35; HS: 45; for coordination in the sense of partly shared preparation but independent teaching: ES: 6; MS: 20; HS: 32; for collaboration in the form of a shared instructional activity from preparation, over teaching to evaluation: ES: 3; MS: 8; HS: 9 (Todd, Gordon, & Lu, 2010; Todd, 2012).

Disciplines/Knowledge domains

The interactions established between librarians and teachers in the context of the ILILE study (N=130) took place primarily in language arts (37%), then in social studies (21%), and then in science (16%) (Todd & Heinström, 2008). For the recent New Jersey study the researchers reported in general terms that "instructional collaborations" took place in the school year preceding the study predominantly in "language arts literacy" (31.3%) and "social studies" (27.9%), and then in science (15.4%), and to a much lesser extent in math (2.5%) (Todd, Gordon, & Lu, 2010; Todd, 2012).

The Delaware study, which collected data from librarians from almost all of the states' public schools (N=154), found differences between knowledge domains. Librarians reported that in the year preceding the study, cooperations took place typically 1 to 5 times per year with teachers of science (52% of librarians reported them), social studies (43%), and math (42%) but more often with those who teach English, for example, "more than 20" were reported by 24% of librarians for English but only 13% for social studies, 11% for science, and 3% for math. Librarians reported the highest number of no cooperations with teachers from the math department (43% of librarians vs. science: 13%; social studies: 11%; English 10%). Math teachers were also the least likely to engage in coordinations (75% of librarians reported no coordinations with math teachers vs. English: 29%; social studies: 31%; science: 40%) and collaborations (89% of librarians reported no collaborations with math teachers vs. English: 60%; social studies: 65%; science: 70%) (Todd, 2005b).

The small case study in a US high school about educators' influence on their students' use of library resources also found that English and social-studies teachers tended to use the library more frequently, and the majority of math teachers reported about using it "never". Teachers directing students towards particular sources was also found to depend on subjects. For example, English teachers were more likely than teachers from other departments to require students to use electronic databases before the internet and to use print before electronic resources. Math teachers, on the other hand, were found to be less likely to allow students to use the resources of their own choice (Williams, Grimble, & Irwin, 2004).

Length of teaching

In the school library impact study in Indiana, which took place in 2006, the researchers found statistically significant relationships between the length of educators' teaching experience

expressed in terms of the year of first employment in K-12 education and their conceptions and practices of collaboration. As far as the former are concerned, it was found that teachers who had begun teaching later were less likely to consider the librarian as an "instructional support" ("before 1985": 90.4%; "1985-94": 87.4%; "1995 or later": 80.7%). For the latter they found statistically significant relationships for two of the ten "library-related activities" listed in the survey question. The newest teachers were least likely to ask the librarian "for resources to design instructional units" on a weekly basis ("before 1985": 17.3%; "1985-94": 21.8%; "1995 or later": 8.3%) and also among those who were less likely to do it seldom or not at all ("before 1985": 10.3%; "1985-94": 5.9%; "1995 or later": 6.2%). Least experienced teachers are also less likely to report that the librarian offers "learning opportunities about new information seeking skills" at least weekly ("before 1985": 10.3%; "1985-94": 5.0%; "1995 or later":1.4%) and more likely to state that he offers it not at all ("before 1985": 16.0%;"1985-94": 13.4%; "1995 or later": 22.1%) (Lance, Rodney, & Russell, 2007). Another study found that younger teachers were more likely to direct students towards databases "sometimes" or "often" than their older colleagues (age 20-29: 41.3%; age 30-39: 40.0% vs. age 40-49: 34.2%; and age 50-59: 22.4%) (Williams, Grimble, & Irwin, 2004).

Various studies have provided strong indications that teachers' conceptions of the library and librarian and their interactions with them are partly shaped by the school grade level and the subjects they teach. Indications about the influence of educators' age or length of teaching experience are weaker. The next subsection reviews research about enablers and inhibitors of teacher-librarian interaction.

2.3.4 Facilitators and Inhibitors of IL Teaching and Collaboration

This subsection discusses research about facilitators and inhibitors of teachers' information literacy teaching and their interaction with the school library and librarian in this context. Two meta-studies addressed the issue. From their meta-synthesis of 10 studies about pre-service teacher education, published between 1998 and 2008 in the United States, Australia, Canada, New Zealand, Taiwan, and the UK, Duke and Ward concluded that there is still an important number of teachers who are not well prepared to teach information literacy (Duke & Ward, 2009, p. 251). In 2007, Haycock reviewed LIS research from the early 1970s onward about "predictors of success" regarding teacher-school librarian collaboration and reported the following six groups of factors:

The environment: A favorable school culture; principal expecting collaboration; school librarians trained in collaboration; "a history and tradition of collaboration";

Membership characteristics: "role clarification, modeling, active involvement, and personal experience";

Process and structure: Clarity regarding roles, especially for the school librarian; flexible or mixed scheduling; planning with groups of teachers rather than individuals; school librarian committed to interacting with teachers; school librarian being involved in assessment;

Communication: School librarian being skilled in building interpersonal relationships and in "social interaction";

Purpose: Shared vision, goals, objectives, resources, responsibilities, commitments;

Resources: Overcome lack of time; a supportive and "skilled principal".

The focus of the present review is on teachers' perspective. First studies are reported that presented results for teachers separately or exclusively and then those that reported them together with those from the librarians' perspective.

2.3.4.1 As reported by teachers

Various researchers reported facilitators or inhibitors of integrated information literacy teaching or collaboration as perceived by teachers. The big, predominantly qualitative study (N=130; 65% school librarians and 35% teachers) about the collaborations established through the Kent State University (Ohio) Institute for Library and Information Literacy Education (ILILE) program from 2002 to 2005 reported findings separately for teachers and librarians; for each theme the two elements that were most mentioned by teachers are presented here:

The motivations for educators' engagement in collaborative interactions were especially "building collegial/collaborative relationships, the opportunity to work with a teacher/school librarian" (80% of all 41 motivations identified by teachers) and then to a lesser extent "encourage teachers' or students information literacy or technology knowledge" (10%).

For teachers, to engage in collaboration with the school librarian, time played a crucial role, but there were other factors involved as well. Teachers' "initial concerns" had to do predominantly with "time & scheduling" (45% out of 40 identified) and then they also had concerns about the project, for example, the "instructional design" (25%). The most cited explanation by teachers for their concerns was "outer structures, 'how things work at school, how things are'" (33% out of 39 identified). Teachers reported as the major difficulty in the planning phase (total identified: 37) "time, scheduling" (57%) and then "scoping out unit, content/focus, what want to accomplish and how, management, division of task" (19%). The major difficulty encountered during the actual teaching was again lack of time (35%), and then "features inherent in the project, e.g. took longer than expected" as well as "students not motivated, not up for it" (for both, 15% of the 34 mentioned difficulties). The study took place in the year that followed the end of the program, in mid 2006, and found strong evidence for continued collaborations but not in all teams; the prevalent barrier was lack of time (85% of factors identified). When teachers were asked about possible "incentives they believed would encourage more instructional collaborations", they identified "time" as the predominant one (50%); others included support of the principal and "tangible incentives such as money or credits", both representing 19% of all incentives identified. The major facilitator for continued collaborations as reported by teachers (67% of factors identified) was successful prior experience; similarly, when teachers gave explanations for their concerns at the beginning of the collaborations at the outset of the project, disappointing prior experiences was mentioned second most (26% out of 39 identified) and lack of prior experience third most (18%).

As "factors behind the success of the collaboration" teachers identified "good team, dynamics, collaboration chemistry, in sync, shared vision, same goals, bonding" and "preparations, organization, effort", each of them representing 24% out of 58 factors, and almost to the same extent "motivation, dedication, engagement, vision, enthusiasm, commitment, drive" (21%). In order to "plan" collaborations, teachers mentioned 44 activities, the most reported was "exchange of ideas, discussion, brainstorm" (41%) and then, and both to the same extent (23%), "structuring, planning, organization" and "practical arrangements and preparations". What they perceived as "strengths of planning" (total identified: 52) were predominantly "clarity, preparation – goal, process, structure were clear, and prepared" (37%) and "team

approach, felt connected, understanding other's strengths and weaknesses" (23%) (Todd & Heinström, 2008).

The encompassing German study in 11 primary and secondary best practice schools in terms of integration of digital media based on semi-structured interviews with educators, reported the following inhibitors and facilitators of collaboration between teachers:

> *Facilitators:* Money, especially from sponsors; professional development outside and within the school; factors related to the individual teacher, such as the readiness towards development of digital literacy and the pedagogical competencies necessary for their integration into teaching; staffing; a school culture that enhances collaboration; a supportive principal; a school culture of feedback and the "readiness to de-privatize teaching".
>
> *Barriers*: Money; time and workload; information technology, adequate rooms; staffing; factors related to the individual teacher, such as the attitude towards new media or age; a low level of information technology literacy that results in low motivation (Eickelmann & Schulz-Zander, 2008).

Several smaller studies also reported facilitators and inhibitors from the teachers' perspective. In Gordon's (1999) action research study in a German international school about the implementation of an authentic research assignment in English in grade 10, the five teachers experienced a conflict between the time needed for supporting students in research tasks and the curricular requirements in their subject. Probert (2009) reported that in her study in three New Zealand schools more than 50% of educators stated in questionnaires (N=148) that students develop information literacy on their own. In semi-structured interviews with head of departments and team leaders (N=15) she identified time as a barrier to information literacy teaching, as well as the expectation that it is addressed by other subject teachers, and the fear that important numbers of students would demonstrate a copy-and-paste behavior. In her survey administered to teachers in four primary New Zealand schools (N=40), Moore (1999) found that teachers with higher expectations regarding student information literacy and especially critical thinking tend to offer more deep information literacy learning opportunities and problem solving tasks to students and make more use in classroom of the respective activities they learned in professional development workshops. Lamb and Todd (1994) reported that the eight interviewed teachers who had implemented integrated information literacy teaching in an Australian secondary school experienced it as time saving because it

enhanced student activity, making class management easier, and allowing them to present subject content in a more structured and "efficient and effective" manner; assessment became an integrated part of learning and the whole process enhanced teachers' "enjoyment level".

2.3.4.2 As reported by librarians and teachers

Other studies involving both school librarians and teachers did not report results separately for the two groups. As teachers represent the majority of participants, results are reported here.

Already in the early 1990s, Kuhlthau investigated the enablers and inhibitors encountered by teachers and school librarians when they implemented her ISP (Kuhlthau, 2004) through an international study, involving secondary schools in the USA, Canada, and Sweden. First, school librarians participated in training institutes, which lasted anywhere from one day to one week and introduced them to the ISP, in their respective countries. Then several of them volunteered to report back on their experiences with projects that they would implement together with teachers in their school. Six months after the implementation of the projects, librarians and teachers were invited to complete questionnaires. After data had been collected over two years, the researcher was able to identify enablers and inhibitors. The most important enablers were a constructivist view of learning, a team approach to teaching, the ability to design process assignments, and a commitment to developing information literacy. Kuhlthau emphasized that facilitators and barriers are not opposites and that "removing the inhibitors will not necessarily assure that programs will be successfully implemented" (Kuhlthau, 1993b). The crucial barriers she found were lack of time, for collaborators regarding planning but also for students working on the assignment; confusion of roles because they had not been clearly defined; and poorly designed assignments, in the sense that they were not suitable for addressing a process approach, given to students at a less appropriate time in the school year, for example, before a holiday, or added to rather than integrated into the course.

In addition, still within the same implementation study, Kuhlthau undertook a longitudinal qualitative case study over four years in one of the schools, a junior high school in the USA, where the ISP had been implemented successfully. She collected data via three focus group interviews and questionnaires from two principals, four teachers, and the librarian; five phone interviews with the librarian; and documents developed by the team and from students.

Kuhlthau identified the following enablers: a well-equipped, well-functioning school library; a team approach to teaching, supported by principals; mutual respect of team members; all team members adhering to constructivism, appreciating the process approach to learning and teaching, and considering it as "a creative endeavor rather than a mechanistic exercise"; fostering lifelong and independent learning as the shared goals of the team; investing the time needed to make sure that students can do well, through extensive preparation, assessment, and the providence of student assistance; helping students especially in the first phases of the ISP; students being invested in their project; teaching small lessons on need; and students collaborating with each other (Kuhlthau, 1993b).

In the qualitative part of the Delaware study, in which 468 staff members from 13 elementary, middle and high schools took part, among them 90.4% teachers in addition to school librarians, principals, and technology specialists, the researchers identified the following facilitators: aspects related to the library as a space, such as "a quiet work place" that is easily accessible and flexible, especially in terms of opening hours and scheduling, a friendly and welcoming librarian, and good resources. Identified as barriers, which prevented faculty from using the library, were problems with information technology, for example, slow computers, and negative experiences of students. The only staff members who wrote about the library as being of "no help" to students were teachers. They did not make use of the library and researchers identified three categories of reasons: teachers who did not consider it as necessary, those who appreciated the library without using it, and those who had been disappointed (Todd & Heinström, 2006b).

In a qualitative study with teachers (N=15) and librarians (N=3), who had achieved high-end collaborations in three schools (covering altogether Pre-K to grade 8), Montiel-Overall identified the following enablers of "high-end collaboration": at least one individual who acts as a "catalyst", highly estimated library and librarian, realizing collaboration with multiple facets, enhancing teaching and student learning as primary goals, building on early successes, and the ability to find solutions for lack of time. In detail, the characteristics and facilitators she identified were, in order of their priority, the following:

> *School culture:* A supportive environment and principal; trust between colleagues; centrality of the library; library integrated with subject curriculum; opportunities for joint planning apart from projects; the ability to establish relationships; time for formal and informal planning; behaving student-centered; accepting different worldviews;

Attributes of collaborators: Having certain personality characteristics, for example, being flexible, open, respectful, friendly, and patient; expertise, especially the librarian's, including his familiarity with subject curricula, but also good pedagogical and classroom management practices; the ability to act as a leader who highly values and respects others;

Communication: About personal and professional issues, without gossiping; sharing knowledge; evolves over time; requires high level of trust; happens through different means, including, face-to-face, notes, e-mails;

Management: Clearly defined goals and objectives with the possibility to change them when needed; supportive principal; flexible library schedules; the ability to overcome lack of time;

Motivation to collaborate: Personal and professional development; benefits for students, for example, more interesting and deeper level of learning tasks, enhanced learning of subject content and information literacy, increased motivation to use the library, working with two adults with different backgrounds (Montiel-Overall, 2008).

These themes were used as a framework for identifying "retrospectively" the characteristics of the successful implementation of collaborations in the context of an Australian action research study, including teachers and librarians from four high schools (covering altogether grades 7 to 12) and supervised by external researchers from Charles Sturt University. The project was initiated in order to develop strategies that would offer students alternatives to plagiarizing and to test them with regular assignments. Through interviews with the librarians and teachers from all schools, the researchers found that, although there were elements of all five themes identified by Montiel-Overall present, prevalent and crucial for the success was a "shared vision and goal". Also, as more collaborative initiatives were undertaken in two of the schools after the end of the project, the researchers emphasized the role of successful experiences as a "catalyst" for school-wide collaboration (Williamson, Archibald, & McGregor, 2010).

In summary, there are not many studies that investigate exclusively teachers' perspectives on facilitators and inhibitors of information literacy teaching or collaboration; also, there is a tendency to study already established and particularly best practice teacher-librarian interactions. However, from the review of the research it became clear that not one single factor is decisive for the success of teacher-librarian collaboration; rather it seems to be a

mixture of factors. Time and especially the ability to surmount the lack of time seem to play an important role, but there are other elements such as a favorable school culture, including a supportive principal; shared objectives but not necessarily the same worldview for which findings were contradictory; good preparation and planning; characteristics of team members, including good interpersonal skills and a commitment to enhancing student information literacy; and successful prior experiences.

The next section summarizes the reviewed research about teachers with an emphasis on gaps in themes and methodologies.

2.3.5 Summary and Gaps in Themes and Research Methods

The second part of the literature report reviewed studies about the teachers' perspective on student information literacy learning, information literacy teaching, and collaboration with the school library.

As far as teachers and information literacy as a topic of research is concerned, the literature review leads to the following claims:

- Studies dealing exclusively with teachers and information literacy are scarce.
- Frequently, the focus of research has been on questions related to the school library, the school librarian, and student learning rather than on teachers, who then tended to be used as observers and reporters (Lance, Rodney, & Russell, 2007; Lance, Rodney, & Schwarz, 2010; Lance & Schwarz, 2012; Todd & Kuhlthau, 2005b; Todd & Heinström, 2006b; Todd & Heinström, 2006a).
- If it was addressed at all, teachers' own perspective regarding student information literacy learning, information literacy teaching, and collaboration with the library was of minor interest, and regularly teachers' perspective was investigated together with that of other staff members, especially school librarians as well as administrators, and not reported separately (Kuhlthau, 1993b; Montiel-Overall, 2008; Todd & Kuhlthau, 2005b; Todd & Heinström, 2006b; Todd & Heinström, 2006a; Williamson, Archibald, & McGregor, 2010).

As far as research methods are concerned, the literature review leads to the following statements:

- If it was addressed at all, the teachers' perspective was investigated frequently through exclusively or predominantly quantitative surveys (Arenz, Huth, & Pfisterer, 2011; Birmingham et al., 2008; Lance, Rodney, & Russell, 2007; Lance, Rodney, & Schwarz, 2010; Lance & Schwarz, 2012; Montiel-Overall, 2007; Montiel-Overall, 2009; Todd & Kuhlthau, 2005b; Todd & Heinström, 2006b; Todd & Heinström, 2006a; Weetman, 2005; Weetman DaCosta, 2010; Williams, Grimble, & Irwin, 2004).
- Quantitative methods could be combined with qualitative methods, for example, qualitative case studies, to form bigger or smaller mixed methods studies (Purcell, Heaps, Buchanan, & Friedrich, 2013; Breiter, Welling, & Stolpmann, 2010; Herring, Tarter, & Naylor, 2002; Herring, 2006; Saunders, 2012; Small & Snyder, 2009; Smith, 2006a; Todd, Gordon, & Lu, 2011).
- In other studies, the researchers relied exclusively or predominantly on qualitative methods (Kuhlthau, 1993b; Merchant & Hepworth, 2002; Montiel-Overall, 2008; Todd & Heinström, 2008; Williams & Wavell, 2001b), for example, in phenomenographic studies (Boon, Johnston, & Webber, 2007; Bruce, 1997; Webber, Boon, & Johnston, 2005; Williams & Wavell, 2007) or action research projects (Gordon, 1999; Herring, 2006; Lamb & Todd, 1994; Williams & Wavell, 2001b; Williamson, Archibald, & McGregor, 2010).
- Regardless of the method, a tendency has been to concentrate on best practice examples, such as best practice school libraries, high-end librarian-teacher interactions, or, in Germany, outstanding schools in terms of integration of digital media (Eickelmann & Schulz-Zander, 2008; Montiel-Overall, 2008; Smith, 2006b; Todd & Kuhlthau, 2005b; Todd & Heinström, 2006b; Todd & Heinström, 2006a; Todd, Gordon, & Lu, 2011). As a consequence, there is no clear picture of how "the entirety" of teachers in a school faculty perceives of and acts regarding information literacy teaching and collaboration.

The present research helped to reduce these thematic gaps through an investigation of the conceptions regarding student information literacy learning as well as the practices of information literacy teaching and collaboration with the library in a whole teacher faculty. In terms of methods this study was innovative and filled a gap in the sense that qualitative case

studies with entire teacher faculties about information literacy or collaboration are scarce. Also, instead of using teachers as observers of, and reporters about, school libraries and librarians, this study collected data from the school librarians, administrators, and students in order to understand teachers better. The next chapter explains the details about the choices regarding the research design.

3. Research Design

This chapter provides a detailed description of the research design of the present study. It utilizes key terms based on Pickard (2007), which are briefly defined in the following in order to provide a foundation for the remainder of the chapter: *research paradigm* for the "philosophical forces driving the research", *research methodology* for "the theoretical perspective of the research", *research method* for "the bounded system created by the researcher to engage in empirical investigation, the overall approach", *research techniques* for "the individual data collection techniques", and *research instrument* for "the device that is designed or trained to collect the data" (pp. xv-xvii).

3.1 Chapter Overview

The chapter begins with a description of the underlying paradigm of the present study, the related methodology, the rationale for using a case study as a research method, and the type utilized. It continues with the reasons for the purposeful selection of the case and a description of its context. Thereafter, data collection techniques and instruments are presented and rationales for their use given; the subsection includes a description of purposefully selected within-case samples. Before reference to the procedures of data analysis, the pilot study is reported with an emphasis on the lessons learned for the final study. The subsection about data analysis begins with a description of the strategies and tools utilized for early analysis, followed by those employed in the in-depth phase, which rely heavily on the systematic procedures for the development of a grounded theory suggested by Corbin and Strauss (2008). The chapter ends with a discussion of the limitations of the study and the strategies used to enhance its trustworthiness.

3.2 A Qualitative Case Study Design

This research was undertaken to gain a deep understanding of the process of information literacy teaching in a faculty; the following research questions were considered:

1. What are teachers' conceptions of student information literacy learning and learners?

2. What information literacy competencies, if any, are encompassed in the research tasks that teachers assign?
3. Which pedagogical interventions, if any, do teachers use when they teach information literacy?
4. How do teachers work with the school library and school librarians, if at all, when they teach information literacy?

This section describes the underlying worldview, explains why a qualitative design in general and a grounded case study in particular are well suited to address the research questions, and characterizes the type of case study that was used.

3.2.1 The Underlying Paradigm: Interpretivism

There is no unanimity in the terms writers use to denominate the underlying philosophical assumptions of research and in the ways to categorize them (Merriam, 2009). In her book about research methods for students and researchers in information science, Pickard (2007) uses the words *paradigm* and *worldview* and distinguishes between three of them: positivism, postpositivism, and interpretivism (p. 7). The ontological and epistemological beliefs that guide this study are rooted in interpretivism and more precisely in "empirical interpretivism", which "deals with investigation in natural settings of social phenomena" (p. 11). Positivists believe in one "objective, independent and stable reality" (p. 8) that can be observed and described in general and in universally applicable laws and hence strive for independence from the subject of their investigation. In contrast to them, interpretivists presume that there are multiple realities that are socially constructed and dependent on the individual and the context, so that they interact with the investigated subject, interpret the meanings the latter assigns to his actions, and report their interpretations by providing detailed descriptions of the context so that the reader can judge about their transferability to other contexts.

3.2.2 Qualitative Methodology

Closely related with an interpretivist paradigm is a qualitative methodology. Major characteristics, as compared to a quantitative approach, are an emergent design that allows the development of hypotheses instead of a linear deductive design that tests them, and an *emic* stance that addresses the phenomenon of interest from the participant's perspective instead of the *etic* one that addresses it from the researcher's (Merriam, 2009; Pickard, 2007). A qualitative, inductive approach is particularly suited when there is a lack of theory (Merriam,

2009), which was the case for teachers' conceptions and practices of information literacy teaching, which have not been addressed in many studies so far (Gapski & Tekster, 2009; Montiel-Overall, 2010; Probert, 2008; Todd & Kuhlthau, 2005b). The qualitative design used in this research allowed to make discoveries (Corbin & Strauss, 2008) and to gain a deep understanding and deep knowledge by investigating the world from the perspectives of participants (Corbin & Strauss, 2008), that is, "how people make sense of the world and the experiences they have in the world" (Merriam, 2009, p. 13).

3.2.3 Rationale for Selection of Research Methods

Qualitative research encompasses a variety of research methods leading to inconsistencies across writers in the ways they are organized (Merriam, 2009). In addition to "basic qualitative research" (p. 22), Merriam (2009) distinguishes between the following six types: case study, critical qualitative research, ethnography, grounded theory, narrative analysis, and phenomenology. In the present research, educators' information literacy teaching was investigated in a case study that was combined with elements from grounded theory.

3.2.3.1 Case study

A case study approach was chosen because it is used more than other types of qualitative research for "the genesis or refinement of theory" (Miles & Huberman, 1994, p. 8) and because one of its major features is doing an in-depth study of a bounded system (Merriam, 2009; Yin, 2009)[3]. Merriam (2009, p. 41) argues that "the unit of analysis, *not* the topic of investigation characterizes a case study" (emphasis in original). The case can be a group of people (Miles & Huberman, 1994; Stake, 1995; Yin, 2009). Thus the approach allowed the study of information literacy teaching in a teacher faculty, which was important because as shown in the literature review (Chapter 2), teachers' conceptions and practices of information literacy teaching have been neglected in research thus far (Gapski & Tekster, 2009; Lance & Schwarz, 2012; Montiel-Overall, 2010; Probert, 2009; Williams & Wavell, 2006a), and if they have been studied, it was often as part of collaboration with school librarians (Montiel-Overall, 2010; Todd & Heinström, 2008) and in the context of best- practice examples

[3] A detailed discussion of the use of case studies in qualitative research was offered by this author as part of the requirements of this doctoral thesis in the German handbook about research methods in the LIS field *Handbuch Methoden der Bibliotheks- und Informationswissenschaft* edited by Umlauf, Fühles-Ubach and Seadle (Mertes, 2013, pp. 152–167).

(Donham, Bishop, Kuhlthau, & Oberg, 2001; Montiel-Overall, 2008; Smith, 2006b; Todd & Kuhlthau, 2005b; Todd & Heinström, 2006b; Todd, Gordon, & Lu, 2011). The aim of the research presented in this report was to gain a comprehensive picture of teachers' information literacy teaching practices and to include educators who teach information literacy on their own, without the school librarian, or who do not teach it at all. Therefore doing a case study about a whole faculty rather than studying individual teachers in one or several different schools was a well-suited option to answer the aforementioned research questions.

Other reasons for deciding to do a qualitative case study were not only that qualitative case studies are common in LIS research (Kuhlthau, 1989; Kuhlthau, 1993b; Merchant & Hepworth, 2002; Todd, Gordon, & Lu, 2011; Williams & Wavell, 2001b; Williamson, Archibald, & McGregor, 2010) but also that, more than other research methods, they take into account the context. Yin (2009) argues that case studies "help to retain the holistic and meaningful characteristics of real-life events" (p. 4) and that they should be used when "the investigator has little control over [actual behavioral] events" (pp. 2; 11). Merriam (2009) also emphasizes that they are "anchored in real-life situations" (p. 51), and Stake (1995) explains that doing a case study is "coming to understand [the activity of the case] within important circumstances" (p. xi). Lance et al.'s studies (for example, Lance, Welborn, & Hamilton-Pennell, 1992; Lance, Rodney, & Hamilton-Pennell, 2000a; Lance, Rodney, & Hamilton-Pennell, 2000b; Lance, Rodney, & Russell, 2007; Lance, Rodney, & Schwarz, 2010; Lance & Schwarz, 2012), have provided extensive evidence about the crucial role of context (for example, a well-equipped school library run by a full-time working certified school librarian) for information literacy teaching and student achievement. Using a case study approach offered the opportunity to ground the in-depth analysis of teachers' information literacy teaching practices in their working context. Also, case study reports typically encompass "a rich and holistic account of [the] phenomenon" (Merriam, 2009, p. 51). Detailed or thick descriptions serve a twofold purpose, not only identifying the precise conditions to which teachers may respond in one way or another, but also ensuring the transferability of findings so that each reader can assess their appropriateness for his or her own situation (Guba, 1981; Merriam, 2009; Miles & Huberman, 1994). In this sense the case study was a particularly well-suited design from a German and European perspective.

3.2.3.2 Analytic procedures from grounded theory

Case studies can be combined with other types of qualitative research, for example, grounded theory (Corbin & Strauss, 2008; Merriam, 2009; Pickard, 2007). As its name indicates, the aim is to build a theory that is rooted in the data (Corbin & Strauss, 2008). It was first presented by Glaser and Strauss in the 1960s and has meanwhile developed into different directions. According to Creswell (2008), the three prevalent directions are the following: the widespread systematic approach developed in the 1990s by Strauss and Corbin who describe procedures of data analysis in great detail (more about it in section 3.6); the more open, emergent approach supported by Glaser who questions the utilization of theoretical frameworks or any preconceived categories and strives for the development of a theory "at the most abstract conceptual level" (p. 438) that should be described without any use of visual aids such as diagrams; and the constructivist approach presented by Charmaz in the first decade of the 21st century who concentrates on "the feelings of individuals as they experience a phenomenon or process" (p. 439), emphasizes that it is the researcher who builds or constructs the theory, and heavily relies on explanatory narratives that result in tentative questions.

Herring (2010), in his doctoral thesis about the transfer of information literacy skills of grade 7 students, followed Charmaz' grounded theory approach, whereas Kerr (2010) relied on the systematic approach as described by Corbin and Strauss (1998) in her doctoral thesis, which investigated information literacy conceptions and practices in academic libraries. The present study also followed Corbin and Strauss (2008) because the structured nature of their procedures and the detailed explanations they provide fit well the needs of the beginning researcher (Creswell, 2008), they allow to make use of sensitizing concepts derived from the literature, they recommend the use of visual tools in order to gain and maintain an overview of concepts and the relationships between them, and because of their "paradigm", which is "a set of questions that can be applied to data to help the analyst draw out the contextual factors and identify relationships between context and process" (Corbin & Strauss, 2008, p. 89).

Pickard (2007) considers grounded theory as "a process of qualitative analysis" and "*not* a research method in its own right" (emphasis in original) (p. 155). The present research used several of Corbin and Strauss' (2008) systematic analytical procedures, for example, making constant and theoretical comparisons, the different coding strategies, and the development of a core category, these and all others used will be described in more detail in the section about

data analysis (under 3.6). A grounded approach was chosen in addition to the case study design not only because it was particularly well suited to address the purpose of the study, that is, to explain or develop a theory of information literacy teaching in a faculty or because it is especially appropriate for LIS user research in general (Pickard, 2007), but also because both case studies and grounded theory emphasize context so that the grounded approach supported the case study method.

3.2.4 The Type of Case Study

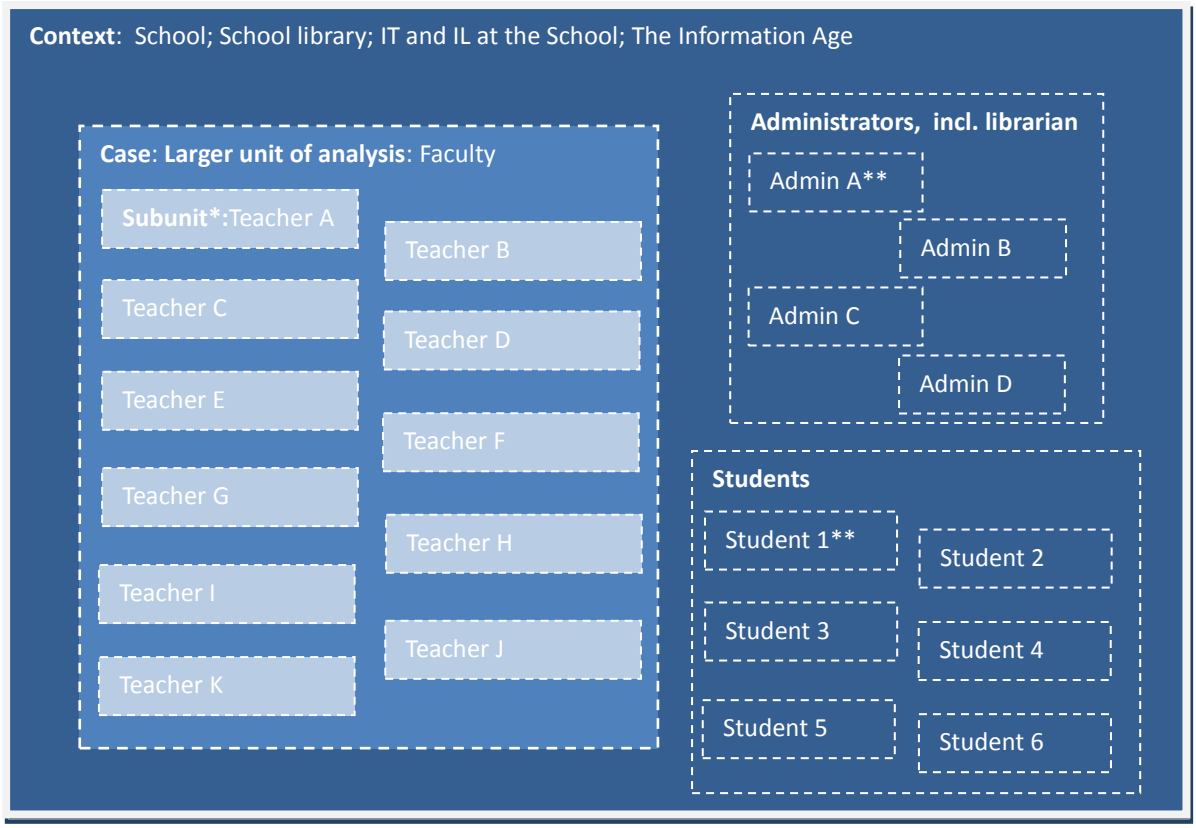
Case studies may deal with single or multiple cases (Miles & Huberman, 1994; Stake, 1995; Yin, 2009). For this research a single-case design was chosen, that is, the information literacy teaching studied in the teacher faculty in one particular school, because it allowed to reach a deeper level of understanding (Simons, 2009) and to "catch the complexity" of that particular case (Stake, 1995, p. xi). Gerring (2007) notes that "the fewer cases there are, and the more intensively they are studied, the more a work merits the appellation 'case study'". Yin (2009) distinguishes between a holistic design with one unit and an embedded case study design with several units of analysis (pp. 46-53); the study used the latter. It encompasses a "larger unit of analysis", the case, which is the teacher faculty as a whole in the present study, and "subunit levels", in the present study the individual teachers who participated in interviews and who were considered as internal subunits of the case, but also administrators (including the head school librarian), and students, who reported about teachers' information literacy teaching practices from outside the case, and were considered as external subunits who are part of the context.

Collecting data from one group of school stakeholders about another one is common in LIS research, for example, asking students about the instruction or assistance they had received from their teachers' when they had to undertake online researches (Ladbrook & Probert, 2011). In the context of school library impact studies, researchers not only asked students about the help they had received from school librarians with their learning and about teacher-librarian collaboration but also identified teachers' and principal's conceptions of these issues (Small, Snyder, & Parker, 2009; Small & Snyder, 2009; Small, Shanahan, & Stasak, 2010; Smith, 2006a; Todd & Kuhlthau, 2005a; Todd & Heinström, 2006b). Support was also found in the comparison of librarians' and teachers' reports about the frequency of educators' library-related activities in the school library impact studies in Indiana (Lance, Rodney, & Russell, 2007), Idaho (Lance, Rodney, & Schwarz, 2010), and Pennsylvania (Lance &

Schwarz, 2012) provided in section 2.3.3.5. It showed that within each of the three states there were predominantly consistencies between the two groups of participants although librarians tended to report higher frequencies.

The structure of the present study is displayed in Figure 3-1, which was adapted from Yin (2009, p. 46), and which also shows the prevalent role of context. The lines between the case and the context are dotted in order to indicate that boundaries between them may be rather vague. Corbin and Strauss (2008, p. 87) describe the context as "structural conditions that shape the nature of situations, circumstances, or problems to which individuals respond by means of action/interaction/emotions. [They] range from the most macro to the micro." The context in which educators teach information literacy at the school chosen for the present study will be described in more detail in the following section in terms of the school, the school library, information technology and information literacy at the school, as well as teachers and the information age.

Figure 3-1: Single-Case Study with an Embedded Design



Note. Adapted from Yin, 2009, p. 46; Admin = Administrators, including the head school librarian; Signs: *Internal subunits or embedded units of analysis, **External subunits

Besides the distinction between single and multiple or "collective" case studies, as he calls them, Stake (1995) discerns "intrinsic" and "instrumental" ones (pp. 3-4). The latter was used for the present investigation as the aim was not to study the teachers as such but to study them in order to "get insight into the [research] question[s]" (Stake, 1995, p. 3). Or, as Miles and Huberman (1994, p. 33) explain, the "people themselves are secondary"; the investigator needs the "people to get at characteristics of settings, events, and processes". In this study, a faculty in a particular school was used to get a deeper understanding of teachers' practices of information literacy teaching and of collaboration with the school library in this context. The selection of the school and the context that it provided are described in the next section.

3.3 The Case: Malotha High School Faculty

In this part of the report the reasons for selecting the Malotha High School faculty as the case of the present study will be explained followed by a detailed description of the school.

3.3.1 Purposeful Selection

The case, in the present study the group of teachers or faculty, needs to be defined through boundaries that "will help to ... distinguish data about the subject of [the] case study (the 'phenomenon') from data external to the case (the 'context')" (Yin, 2009, p. 32). It needs to be defined spatially (Gerring, 2007; Creswell, 2008; Yin, 2009): the faculty of an independent high school in the central part of the Mid-Atlantic States participated in the present study. Yin (2009) strongly recommends distinguishing clearly between the people inside and outside the case. As explained in the previous section and shown in Figure 3-1, in the present study the individual teachers who participated were considered as internal subunits of the case, whereas administrators and students were considered as external to it and with that, a part of the context. The case needs temporal boundaries (Creswell, 2008; Gerring, 2007, Yin, 2009); data collection in the present study took place between September 2010 and March 2011.

Embedded case studies require sampling on two levels, first for the larger unit of analysis, then for subunits (Merriam, 2009). Here the former is described whereas the latter will be explained in detail in the next section about data collection (under 3.4). Purposeful sampling was used in order to select the faculty or school. Merriam (2009) and Miles and Huberman (1994) state that non-probability sampling and especially purposeful sampling is the prevalent method in most qualitative research as opposed to probability and especially random sampling

in quantitative studies. Patton notes: “The logic and power of purposeful sampling lie in selecting *information-rich cases* for study in-depth. Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the inquiry” (emphasis in original) (Patton, 2002, p. 230).

The Malotha High School faculty was selected for the study because it was expected to be an information-rich case. Several writers (Miles & Huberman, 1994; Stake, 1995; Yin, 2009) suggest the use of unusual or unique rather than typical cases, especially when doing single case studies. Merriam (2009) defines such a case as one that has “atypical, perhaps rare attributes or occurrences of the phenomenon of interest” (p. 78). Malotha faculty is unusual and atypical in the sense that several of the teachers together with the school librarian have reached an outstanding level of information literacy teaching for which they have received several awards from both federal and state library associations, and in the sense that in three classes, each time one in grades 9, 10, and 11, information literacy teaching is formally integrated into the curriculum (Informal conversations with administrators, spring 2011; Curriculum Guide, 2010-2011). It was also expected to be information-rich because the approaches towards information literacy teaching were said to vary from class to class or program to program and because the faculty seemed to encompass teachers who do not teach information literacy at all or who teach it without the school library (Informal conversations with the school librarian and the key teacher informant during the first visit at the school in autumn 2010). Other reasons for choosing Malotha were that it is an independent school, where, per definition, teachers have more freedom to design their curricula than in public schools, and the school was willing to participate, which was listed among relevant selection criteria by Simons (2009) and Stake (1995).

The detailed descriptions of the school that follow, of the school library, information technology, and information literacy at the school as well as Malotha teachers and the information age, provide the context for the investigation about educators’ information literacy teaching but are also intended to ensure that readers have the possibility to assess, if at all and if applicable, to what degree findings can be transferred to their own schools (Guba, 1981; Merriam, 2009; Miles & Huberman, 1994). They are based on documents, informal conversations, and formal interviews. Most documents are available on the web; therefore, no direct quotes are used in order to protect the anonymity of the site.

3.3.2 Malotha School

Malotha School is a small co-educational independent day school located in the central part of the Mid-Atlantic States, in a wealthy, suburban area. It consists of three divisions: the Lower (Grades Pre-Kindergarten-4), the Middle (Grades 5-8), and the Upper or High School Division (Grades 9-12), which is the largest one and which participated in the present study. In the following subsections, the school, with an emphasis on the high school division, will be described in terms of its administration; the student body, including socio-demographics; its teachers; its educational program; the organization of school year and day; and a brief description of the building. This information will help to interpret the findings about teachers' practices of information literacy teaching (Chapter 5) and they will allow the reader to judge about the transferability of the findings to other settings.

Administration

The National Association of Independent Schools (NAIS) defines this type of schools as "nonprofit corporate entities [that are] independent in governance and finance" (National Association of Independent Schools, 2012b). Malotha School is governed by an elected board of trustees in which parents, alumni, and members from the community are invited to participate. The administration and the responsibility for daily affairs lie in the hands of a headmaster who is appointed by the board and who is supported by the directors of the three divisions as well as several other directors, for example, the Director of College Guidance, the Director of Studies, the Director of Technology, and the Dean of Students.

Malotha students

The student population at Malotha High School during the 2010-2011 school year (AY2010/2011) was "slightly more than 300 students" (Informal conversation with an administrative secretary, spring 2011). In order to protect the anonymity of the study site, no detailed information about student enrollment per grade will be provided. Malotha School "is fairly selective" (Informal phone conversation with school librarian, winter 2010) and the majority of students are high achieving. However, the school's philosophy is to serve a student body that is diverse in terms of talents, experiences, and personal backgrounds. The school keeps and supports academically weaker students (Informal conversation with school librarian, spring 2011). Eighty-five percent of their students are White, 10% are African Americans, and 5% are Hispanic Americans, Asian Americans, or others (Informal

conversation with an administrative secretary, spring 2011). The majority of Malotha students lives in suburban areas and has upper middle class or upper class backgrounds. The study took place in the high school only, and the tuition of this division, at the time of the study, was about $30,000 per school year. Each year, about one-fifth of their students get financial aid from the school; the amounts vary from $4,000 to more than $ 20,000 (Informal conversation with an administrative secretary, spring 2011).

Malotha teachers

Independent schools are free to determine the qualifications their teachers should have (Bassett, 2004). At Malotha, division directors are responsible for hiring and evaluating teachers. The school strives for diversity in its faculty (Strategic Plan, 2005) and describes its teachers as versed in their disciplines, dedicated, willing to collaborate with colleagues, and motivated life-long learners. Their teachers emphasize students' active engagement in the learning process, create an atmosphere of respect and trust in their classrooms, and care about their students (School website, spring 2011). In AY2010/2011, the high school division had 31 classroom teachers, 90% of which were working full-time. More than 90% had advanced degrees. In addition, two of Malotha administrators also had teaching assignments in the high school.

Malotha's educational program

Independent schools are free to decide, without state mandates, what students learn and how their achievement and progress are assessed (National Association of Independent Schools, 2012a). The Director of Studies at Malotha School explained that their high school teachers develop the curricula for the courses they teach in the context of their departments. He[4] also noted that, compared to public schools, it is a lot of freedom for teachers and he described it as both a great responsibility and a great opportunity for teachers (Informal conversation, autumn 2010). The school offers courses in the humanities, mathematics, the sciences, and technology with an emphasis on interdisciplinary and deep learning. They have high-level extracurricular programs, for example, in the arts and organized sports, and provide opportunities for service learning. One of the school's major aims is to prepare students for college; in addition to regular courses, they offer honors and AP courses. Honors courses

[4] Both men and women participated in the study, but in order to protect their anonymity within Malotha School, this report only uses the masculine gender for referring to participants.

encompass more complex and in-depth study than standard courses whereas AP courses offer college-level material that prepares students for national exams, such as the ACT (originally "American College Test") and SAT (originally "Scholastic Aptitude Test"). Both types of courses can be taken from grade 10 onwards but only by those students who meet the entrance requirements. Honors courses are available in all departments and AP courses in the core disciplines. In AY 2010/2011, 5% of grade 10 students, 50% of grade 11 students, and 50% of grade 12 students were enrolled in one to three AP courses.

Malotha School does not rank their students or publish any of their results in what form ever. Ninety-five percent of their graduates successfully attend four-year colleges or universities (Informal conversation with Director of Studies, spring 2011). Out of the 110 students who graduated in 2009 and 2010, about 18% went to Association of American Universities member universities (School website, spring 2011). In addition to preparing students for success in their academic and private lives, the school wants to inspire in them an interest and motivation for lifelong learning. Respect for others is a highly regarded value and Malotha School strives to create an atmosphere in which the social-emotional well being of each individual student is protected and supported. Class sizes are small with an average of fourteen to sixteen students, depending on the subject and grade.

Organization of school year and days

A school year is organized around two semesters and there are full-year as well as semester classes. The school day begins at 8:15 a.m. and the last courses end at 3:00 p.m., Monday through Friday. Malotha operates on a modified block schedule that encompasses seven courses. All classes meet four times each week: twice for 45 minutes, once for 55 minutes, and once for 75 minutes. Students typically have a six-period course load (Informal conversation with Director of Studies, spring 2011). All grade 9 students and those grade 10 to 12 students with academic difficulties are required to spend their free periods in a monitored study hall.

The school building

The school has a campus field and Administrator A explained that the high school consists of two entire buildings and, in addition, uses classrooms in other buildings (Administrator A, par. 71). Math and science classrooms are grouped in one buildings, English literature and history classrooms in one, and foreign language classrooms in another one. Each one of the

full-time teachers has his own classroom with an office table where he can work during free periods. Teachers who have a reduced teaching load and also work for the administration have an office (Informal conversation with school librarian, spring 2011).

3.3.3 Malotha School Library

The library of the high school division will be described in terms of staffing, size and structure of the space, collection, scheduling, budgets, and technology. Wherever it is possible, data will be compared with the results of a study in one of the Mid-Atlantic states, New Jersey, that was published in 2010, the year in which the present study began, and conducted by Todd, Gordon, and Lu from the Center for International Scholarship in School Libraries at Rutgers University for the New Jersey Association of School Librarians. The first phase of this comprehensive study sought to provide an encompassing description of the status of school libraries in the state. It collected data through an online survey, for which 765 valid responses were received, that is 30% of New Jersey schools. About one-fourth (24.5%) of participating schools were high schools but only about 3% were private schools. Wherever it was available in their report, data about high schools was used for comparison. The detailed description of the library helps to interpret findings (Chapter 5) and enhances their transferability.

Staffing

In school year 2010-2011, Malotha High School library staff was composed of four members: the head librarian and another librarian who both own a Master of Library and Information Science (MLIS) degree with a specialization in school librarianship and work full-time; one assistant who had professional experience in a library-related field and had been trained by the two school librarians for the specific tasks she was responsible for - she worked full-time and all three had been at Malotha for more than 10 years; the other assistant, an intern, was a former student who arrived at the library at the beginning of the school year and was supposed to leave in June the following year (Informal conversation with school librarian, spring 2011). The New Jersey study found that about 60% of library staff in the sample had an MLIS degree and 91% of participating schools (regardless of type) had full-time employment. Moreover, about one-third of high schools did not have any support staff at all, 35.5 % had one full-time equivalent (FTE), 7.7 % had two FTEs, 2.2 % had three FTEs, and 2.7 % had more than three FTEs (Todd, Gordon, & Lu, 2010). The comparison shows that in terms of staffing, the Malotha Highs School library is well-equipped.

Size and structure of the library space

The library has a surface of 5500 ft^2 (almost 511 m^2). It has one big open space separated into the main library room and a reference room. The reference room offers 32 seats for studying and working around tables organized in four rows, offering eight seats per row. They are especially used by classes or groups. There are another eight seats for individual work in other parts of the reference room. The main library room offers 41 seats for working and studying and an additional 27 armchairs with low tables for recreational reading and meeting socially. The library computer lab with 20 seats is in a separate room next door. For staff members there is a separate meeting room and the head librarian has her office in another separate room. With regards to the library space, there was no information available from the New Jersey study for comparison.

Collection

At the time of this study, the library had about 20,000 books in its collection, mainly in English. The percentage of non-fiction was 90% and the average copyright date was 2005. Librarians bought between 200 and 250 new books every year (Informal conversation with school librarian, spring 2011). According to the New Jersey study, the average number of books in school library collections was 13,028 (Todd, Gordon, & Lu, 2010). Malotha High School library had subscriptions to two newspapers, about 95 journals - two of which were only online versions whereas all others were combined print and online versions - and to 16 electronic databases (Informal conversation with librarian assistant, autumn 2010). The New Jersey study found that on average, school libraries in their state had subscriptions to 2.1 newspapers, 28 magazines, and 6.9 electronic databases. For all three types they reported that there were more school libraries that did not have any subscriptions than libraries that did (Todd, Gordon, & Lu, 2010). As far as non-print materials are concerned, at Malotha there were about 1,000 different DVDs, CDs, and Videos (for example, classical music and fictional films, almost all chosen to fit into the curriculum), about 500 microfiches and 100 microfilms (Informal conversation with school librarian, spring 2011). As no precise numbers were available for the different formats, a comparison with the results of the New Jersey study was not possible. Microfiches and microfilms were not reported in that study. Teachers and students at Malotha could also use interlibrary loans throughout the state (Parent and Student Handbook, 2010-2011). As a conclusion of the comparison it can be said that Malotha High School library is well-equipped in terms collection size, as well as subscriptions to magazines

and electronic databases, and at an average level in terms of subscribed newspapers. The availability of microfiches is rather unusual in school libraries but the head school librarian explained that students like them a lot although they are outdated (Informal conversation, spring 2011).

Scheduling

Malotha High School library is open from 8:00 am to 5:30 pm, Monday through Friday, so that students can use it before and after school (Informal conversation with school librarian, autumn 2010; Parent and Student Handbook, 2010-2011). The New Jersey study showed that slightly more than half (52.1%) of school libraries in their state operate on an open access schedule, so that they can be used outside the school day (Todd, Gordon, & Lu, 2010).

Budget

The head librarian at Malotha library has a budget of just under $40,000 per year whereas the average high school budget in New Jersey is $29,228 (Todd, Gordon, & Lu, 2010).

Technology

As Table 3-1 shows, Malotha High School library is rather well-equipped in terms of technology, with an automated circulation system, an automated, online catalog that is accessible 24 hours a day, 7 days a week, four staff computers, four printers including one color printer and one for microfiches, a copy machine, an LCD large-screen monitor, two microfiche and microfilm readers, a digital overhead projector with a drop-down screen, a VCR-player, a DVD-player, a document camera, a video data projector, a smart board, a scanner, two digital cameras, a video camera, a whiteboard, an MP3 player, and two electronic book readers (Informal conversation with school librarian, spring 2011; Interview with Administrator A, par. 71-72). However, in terms of computers available for student use, 18 in the library itself and 20 in the library computer lab next door, the school library falls below the New Jersey high school library average of 44 computers (Todd, Gordon, & Lu, 2010).

Table 3-1: Comparison of IT in Malotha Library and in Libraries in NJ Study

Technology	Malotha High School library	Percentage of high school libraries in NJ study
Automated circulation system	Yes	97.6 %
Automated catalog/Web-based catalog	Yes / Yes	98.6 % / 63.6%
Computers for student use	38 laptops: 18 in the library itself and 20 in the lab nearby; all with internet access	On average 44 with internet access
Staff computers	4	NA
Printers	2 black and white, 1 color, 1 for microfiches	97.6%
Copy machine	1	90.0%
LCD panels	1	27.1%
Microfiche and microfilm readers	2	NA
Digital overhead projector	1	Overhead projectors in 74.1%, but no detailed information about digital ones
VCR-player	1	80.7%
DVD-player	1	83.7 %
Document camera	1	15.0 %
Video data projector	1	51.2%
Smart board	1	34.3%
Laminator	0	50.06%
Scanner	1	52.4%
Digital camera	2	38.6%
Video camera	1	29.5%
Whiteboard	1	33.7%
IPod/MP3 player	1	7.2%
Electronic book devices, e.g., Kindle	2	4.8%

In summary, it can be concluded from the comparison with schools in the New Jersey study that as far as staffing, collection size, including subscriptions to magazines and electronic databases, and budget are concerned, Malotha High School library is well-equipped. It is average regarding newspaper subscriptions and slightly below average regarding computers for student use. Operating on an open access schedule that offers access before and after class time is not the rule, but Malotha library does so.

3.3.4 Information Technology at Malotha

In this part, information technology facilities outside the library are described. The school provides teachers with state-of-the art technology. Administrator A claimed that Malotha is "certainly a well outfitted school" (Administrator A, par. 21) where the typical classroom is equipped with a computer that is connected to a digital projector and, up on the teacher's request, a smart board and a document camera (Administrator A, par. 68). In addition to the library computer lab, the school has another PC lab with about 18 desktop computers and a multimedia room with 50 to 55 seats (Administrator A, par. 71-72). They have a high-performing broadband computer network across the school (Administrator A, par. 66), and, at the time when the study took place, the school had started to install a wireless system which covered most of the classrooms (Teacher E, par. 38; Administrator A, par. 69) though not all (Teacher G, par. 31). Another recent development was the creation of an intranet that had a class website for every teacher (Student 2, par. 30; Student 5, par. 36) and allowed protected communication between administrators, teachers, students, and parents (Administrator A, par. 47).

Students and information technology

With regard to students' access to information technology at home, Student 2 claimed that "a lot of [his] friends only have one laptop or one computer at home", which has to be used for private and school purposes (Student 2, par. 148). Administrator A reported that all of Malotha students had access to information technology and the internet in the home environment (Administrator A, par. 34), whereas two teachers (Teacher E and G) expressed some doubts: Teacher E only talked about "most" students having access (Teacher E, par. 51) and Teacher G noted "I would hate to think that it's only these kids that come from very comfortable families or who have an older brother. I would hope that everybody could get access to what they need" (Teacher G, par. 41).

Malotha students also bring their own information technology to the school. Administrator A noted that "students can bring laptops into classes, and in any classroom you will see plenty of laptops, again, not universal, it's a student choice there" (Administrator A, par. 69). Student 6 and two teachers (Teacher E, J) also reported about students bringing their own laptops (Student 6, par. 49; Teacher E, par. 81; Teacher J, par. 92). Administrator D described it as a recent development and explained that students may bring different types of information technology: "Just a few years ago, there might have been a handful of kids that I would see

around the school with laptops. Now you see many kids with laptops, many kids with iPads, many kids with iPhones" (Administrator D, par. 16-17). And students are allowed to use their technical devices in class (Student 6, par. 49; Administrator D, par. 26). Student 5 reported about teachers discussing the issue of providing tablet computers to all students (Student 5, par. 145).

Teachers and information technology

Teachers tend to be less familiar with information technology than their students. Teacher A noted that students "are online a whole lot more than [he is]" (Teacher A, par. 74) and Teacher G described students as more competent users of computers than he is (Teacher G, par. 40). Administrator D noted that it is among teachers' "responsibilities to get familiar with the new technologies" because "the kids frequently come to school with more understanding of them than those of us who are here" and teachers should acquire "at least a functional literacy about the technical world that our kids have grown up in" (Administrator D, par. 53).

Malotha teachers are expected to integrate information technology in their teaching. The school fosters the use of information technology in all subjects and grades (Strategic Plan, 2005), describing its use in education as a necessity and as a way to complement and enhance teaching strategies and to expand students' learning experiences (Parent and Student Handbook, 2010-2011). In the focus group discussion, Student 2 noted: "I feel like since my freshman year they've-, there's been a real push among teachers and the school in general towards learning from computers and other online sources" (Student 2, par. 32). Administrator B referred to "email [and] other digital kinds of communication" when he noted that "the expectations of what a teacher should do are far higher now than they were ten years ago" (Administrator B, par. 70-72). And Administrator D compared the recent situation to that approximately 15 years ago and noted: "Even the use of computers at the school in 1995- They were here but they weren't very much what I would call a vital part of the equipment that students used" (Administrator D, par. 26). Teacher G said that he came to realize how the availability of web tools can lead to changes in teaching and learning (Teacher G, par. 35).

Teachers use information technology in order to support "delivery" (Administrator A, par. 19), for example, "good websites" and "video clips" (Administrator A, par. 16). Students reported about "the majority" of their teachers using document cameras (Student 2, par. 56; Student 3, par. 69; Student 5, par. 70). Teacher B often uses "teaching DVDs" (Teacher B, par. 38),

Teacher E regularly uses the internet to support his teaching (Teacher E, par. 40-50). Teacher K uses the projector in his classroom or in the library's lab in order to teach students about databases (Teacher K, par. 61) and Teacher F almost exclusively teaches with the computer (Teacher F, par. 13). Students also indicated that teachers post handouts and assignments on the new intranet (Student 1, par. 38; Student 2, par. 30-32; Student 4, par. 82; Student 5, par. 36). Student 3 reported about teachers making information available to students on the intranet so that students did not have to take notes during the lesson (Student 3, par. 67).

Administrator C, on the other hand, reported about "teachers who feel really overwhelmed" with the huge amount of information and tools available on the web for teaching. The reasons he mentioned were time and the fact that the teachers need to evaluate the information and to integrate it with their other materials before they can present it to students (Administrator C, par. 19). He noted:

> Well, certainly I have teachers who say to me– if we are studying something in history we can get the actual speech that was given on that day, we can get a video of it, I can link it to this information and that information and how do I do that in addition to everything else that I'm doing on any given day. So, I mean there are great benefits into having all of this instant access to information but there is also a challenge in how you put it in meaningfully everyday. ... I think it is kind of nerve-racking to think about all the information that's out there ... and how do you put it all in, so that you as a teacher are presenting something that's interesting but also meaningful and accurate. (Administrator C, par. 17-19)

The school has a Director of Technology who is responsible for and fosters the installation of hardware and software at the school level and helps teachers on an individual level to integrate the tools in their teaching (Administrator A, par. 47).

3.3.5 Information Literacy at Malotha

Malotha School strives to enhance lifelong learning (Malotha School Website, Mission Statement) and critical thinking (Parent and Student Handbook, 2010-2011; Strategic Plan, 2005), concepts that are closely related to information literacy. The enhancement of information literacy in all courses, and the term is explicitly used, is mentioned as one of the objectives in the school's strategy document: information literacy is considered as being part of information technology and encompasses the location and evaluation of information as well as the ability to understand it (Strategic Plan, 2005).

The school has a strong and long tradition in research and writing (Strategic Plan, 2005). In the Curriculum Guide, a document for parents that gives an overview of the courses among which students in grades 9 to 12 can choose, the history and the language department list "research" among the competencies that students will develop in the courses they offer (Curriculum Guide, 2010-2011). All students are required to do an extensive research project in grades 9, 10, and 11 (Administrator A, par. 36; Student 3, par. 285; 289). Teacher J noted that "this school in particular is big on the 9th grade research project, the 11th grade research, the 10th grade research project" (Teacher J, par. 60).

The school has a rigorous plagiarism policy and students of all grades are required to document any sources they use in their works. Failing to do so is considered "a very serious academic offense" and the classroom teacher together with the Dean of Students decide on the disciplinary measures, which may take the form, for example, of a zero in that particular assignment or measures determined by the Honor Board. However, any student who plagiarizes will lose the eligibility for any leading position and any type of recognition or award in that particular school year (Parent and Student Handbook, 2010-2011).

When he was asked how the school supports teachers in their information literacy teaching (see interview guide in Appendix 4), Administrator A first referred to the fact that, at Malotha, the number of required classroom hours and the number of students within classes leave teachers with enough time for their preparations. He noted:

> They have reasonable loads: They don't teach too many classes, they don't teach too many students. That's important because it means they have time to prepare for class. I think the big problem with too many students and too many classes is not that a good teacher can't manage that, it's that they have no time to do anything else, and that's the real problem. So, here the support comes first and foremost in the teacher assignments, and that is what teachers have to do as part of their job. (Administrator A, par. 60)

Typical teacher assignments are five courses in the humanities and four courses for teachers who teach science labs or for department heads (Informal conversation with Director of Studies, Feb 2011).

In addition, teachers have "reasonable budgets" for supplies, "whether it be text material, film material, whether there is budgeting for field trips or guest speakers" (Administrator A, par. 62) and they have "good classroom facilities" in terms of "literally the footprint of the room, good space, tables, furniture, furnishings, all very nice" as well as with regard to technology (see above) (Administrator A, par. 65-66).

Two other administrators (Administrator C, D) explained that the school supports teachers in their information literacy teaching through professional development. Malotha School strives to hire teachers who are committed to life-long learning and continuous professional development (Strategic Plan, 2005). On its website the school states that professional development is highly valued and all teachers are expected to participate in it (School website, spring 2011). Administrator D also emphasized the crucial role of in-service training and described various forms that are used at their school, such as visiting other schools, attending professional discussion groups either in person or online, and participating in onsite training days (Administrator D, par. 53). Among other topics, the school offers onsite and offsite opportunities for professional development in technology training and especially in the use of state-of-the-art technology (Strategic Plan, 2005). Administrator C noted:

> We have professional development days where teachers are learning about how to use different topics, different sites, different information; we send teachers to summer institutes or to professional development days elsewhere to learn about information gathering. ... Last [Season XY] we had about five or six teachers go to another school, to [School XY]. They were doing a presentation on information on the use of the internet, on how to gather information and kind of topics your students can use in their classes. Five or six teachers went down on a day, I think it was during this late [Season XY], so we didn't have school that day. ... There was a speaker and then there were sessions that they chose to be a part of. (Administrator C, par. 33-37)

3.3.6 Malotha Teachers and the Information Age

Up until now, only structural conditions at the micro-level have been described; however, study participants also referred to the more macro-level information age. Administrator A claimed that "almost all classroom teachers recognize that it's the information age." (Admin B, par. 14). Teachers mainly referred to it in terms of the availability of huge amounts of information; in school documents it was also described in this way (Strategic Plan, 2005). Teacher A noted that we are living in "a time ... when we are bombarded with information" (Teacher A, par. 74). Teacher H claimed that there has been a change going on "over the last 10 years, 15 years" and that "there's so much more information out there, so many sources" for students and especially for adults. He noted: "Overall, as an adult you're faced with more information in the world, more sources of information and varying opinions, and you have to be able to decide for all of that, pretty much independently, without guidance." (Teacher H, par. 46). For Teacher J, one of the characteristics of "the time that we're in right now, ... this 21st century learning environment" is that "they [students] so often have information just at

the very tips of their fingers" (Teacher J, par. 54). Teacher K explained that "students today ... conceptually very much live in the world of the internet and the web, and there's a lot of information on there" (Teacher K, par. 18).

The previous section explained how and why the Malotha High School faculty was selected for this case study and described its context in terms of the school, the school library, information technology and information literacy at the school, as well as teachers and the information age. The detailed descriptions were intended to enhance the interpretation of findings (Chapter 5) and their transferability to other settings. In the following section, data collection at Malotha is described.

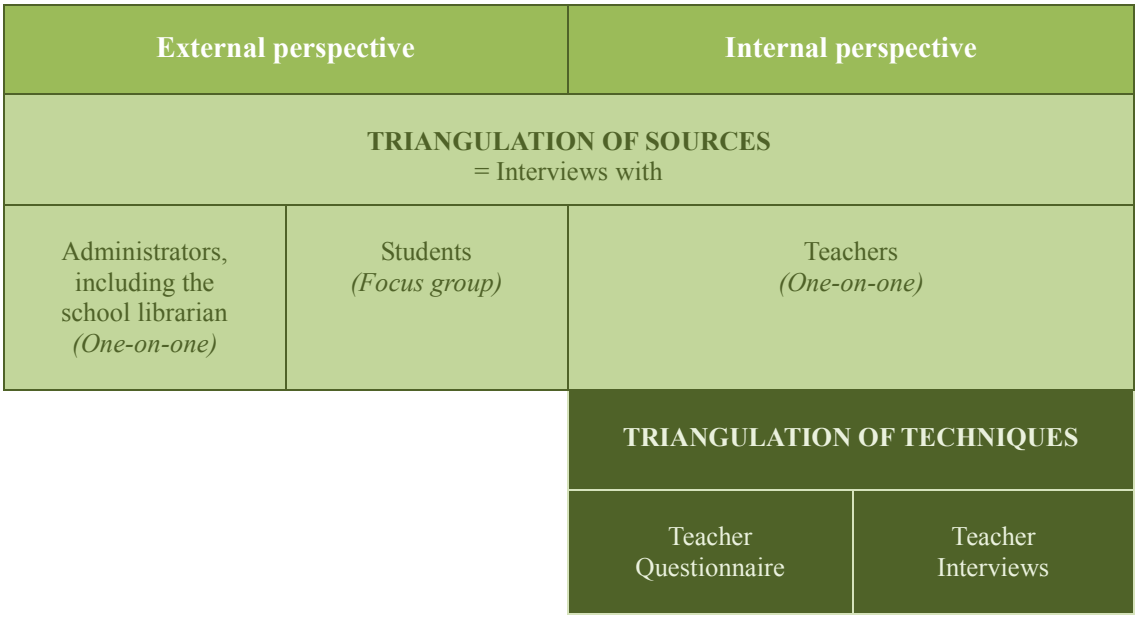
3.4 Data Collection at Malotha

The first part of this section provides a rationale for using a questionnaire and different types of interviews as techniques for data collection in this case study; it also describes the samples utilized. The second part gives an overview of the data collection procedures.

3.4.1 Techniques and Instruments: Justification

In qualitative research the investigator "*is the primary instrument for data collection and analysis*" (emphasis in original) (Merriam, 2009, p. 15), he seeks to gain an understanding of the phenomenon under study from participants' perspective. In order to gather the data, he chooses techniques and develops instruments that are consistent with the purpose of the study and the research questions. Before explanations about the techniques and instruments used in the present study are provided, it should be noted that more than one data collection technique was not only used because case studies typically do so (Pickard, 2007) but especially because it sought to enhance the trustworthiness of findings through triangulation, and especially their confirmability, dependability, and credibility (Guba, 1981; Miles & Huberman, 1994). Simons (2009) describes the evolution of the concept of triangulation: It evolved from a means of seeking convergence or confirmation of issues and themes in the data in order to get "closer to the 'truth' of the reality" (p. 130) to a means of "exploring different perspectives and how they do or do not intersect" (p. 131). In the present study triangulation was used in both ways. Pickard (2007, p. 86) argues that "*triangulation* within a case study can be achieved by using multiple data collection techniques or multiple sources of evidence, or very commonly both" (emphasis in original); the present study used both (Figure 3-2).

Figure 3-2: Triangulation



For triangulation of sources, that is, utilizing the same data collection technique for different sources, interviews were conducted with teachers, administrators (including the head school librarian), and students, with the latter in the form of a focus group discussion. For triangulation of techniques, that is collecting data from the same sources with different techniques, data were collected from teachers not only in interviews but also in questionnaires. Data collected from teachers assisted in gaining an understanding of Malotha faculty's information literacy teaching from the inside (internal perspective) and data collected from administrators and students helped to look at it from the outside (external perspective). Collecting data from teachers in a third way, via documents, was considered; however, in the pilot study it was difficult to access documents developed by teachers, and this remained true for Malotha School. At first, the use of the school's online curriculum guide appeared to be a solution. But besides the fact that it was meant to be kind of an information and marketing tool focused towards parents, neither exact authorship nor the date of the last update were clear; thus, it was decided to renounce it as a data collection tool. It was only used, together with other documents, for preparing the phase of formal data collection (Simons, 2009) and for describing the context of the case (Merriam, 1998).

3.4.1.1 Shared features of questionnaires and formal interviews

The questionnaires and interviews used in the present case study share several features, which will be described first before the particularities of each technique.

More appropriate than observations

One common advantage of questionnaires and interviews was that they helped in gaining unobservable information (Patton, 2002), for example, events and behaviors that happened in the past (Merriam, 2009; Patton, 2002) and over a longer period of time. The aim of the study was to explore teachers' practices of information literacy teaching in their everyday professional lives, that is, not within a specific time frame, and hence these techniques were preferred to observations.

Mainly open questions

Open questions were predominantly asked in the instruments for both techniques so as to be consistent with the underlying interpretative paradigm of the study and its qualitative methodological approach, according to which educators' information literacy teaching was addressed from the participants' perspective. Although they were initially based on conceptions from the literature and pilot study findings (Corbin & Strauss, 2008; Miles & Huberman, 1994), questions were open in the sense that they helped the investigator to focus data collection without leading subjects into certain directions (Kvale, 2007), and that they were formulated broad enough to allow the investigator to enter other people's mind and to explore their conceptions, experiences, and interpretations of their worlds (Kvale, 2007; Patton, 2002; Pickard, 2007). Open questions in questionnaires and even more in interviews usually lead to rich, thick, and detailed data in the words of participants (Kvale, 2007; Pickard, 2007). In the past, information literacy research in the school context was mainly undertaken by library and information science professionals and with a focus on the school library (Williams & Wavell, 2006a, p. 2). The aim of this research was to gain an understanding of teachers' perspectives and exploring their concepts, terms, and expressions.

However, questionnaires and interviews also contained a limited number of quantitative questions. They were used in order to quickly collect some background information about participants at the beginning of the instrument administration, and in questionnaires the three yes/no questions at the beginning of parts 2 through 4 led those teachers who had not been involved in information literacy teaching and/or collaboration at all in a fast way through questionnaire completion. Instruments were added as appendices to this report, the questionnaire as Appendix 10, informed consent forms for interviews in Appendices 1 through 3, and interview guides as Appendices 4 through 6.

Descriptive questions

Descriptive questions form "the backbone" of interviews (Spradley, 1979, p. 91). In all instruments an important number of descriptive questions was used to collect data about practices and experiences (in the questionnaire: questions 6.2, 7.2, 9, 10, 11, and 12; in teacher interviews: Theme 1 and 3; in administrator interviews: Theme 2, 3, and 4; in the focus group discussion with students: Theme 2 and 3), and about conceptions (in questions 3, 4, and 5 of the questionnaire). Spradley (1979) distinguishes between five types of descriptive questions: grand tour questions, mini-tour questions, example questions, experience questions, and native-language questions. In questionnaires, grand tour questions were used, which "offer almost unlimited opportunities for investigating smaller aspects of experience" (p. 88). In interviews, each theme also began with a grand tour question, but then based on the respondent's answers, probes in the form of mini-tour questions, which "deal with a much smaller unit of experience" (p. 88), example questions, which queried for examples, and experience questions, about experiences in particular situations, were used.

Structural questions

Descriptive questions were complemented by structural questions. They helped the investigator "to find out *how* informants have organized their knowledge" (emphasis in original) (Spradley, 1979, p. 60). Out of the five types that Spradley discerns, the following were used: in questionnaires (questions 6.1, 7.1) cover term questions, which invited participants to talk about included terms; in interviews verification questions, which were used as probes in order to gain more clarification and to verify the investigator's interpretation.

General principles of question formulation

Regardless of the type of questions and the instrument in which they were used, several general principles were applied. For instance, questions were "short and simple" (Simons, 2009, p. 50). Moreover, attention was given to avoid "potentially offensive questions" (Pickard, 2007, p. 185), "multiple questions", that is asking more than one question at a time or questions that encompass alternatives, "leading questions", which "reveal a bias or an assumption that the researcher is making" (Merriam, 2009, p. 99), and "jargon or technical language" (Pickard, 2007, p. 185). Instead of why-questions, which include "a multitude of

dimensions" so that answers risk not being "relevant, usable and interpretable" (Patton, 2002, p. 365), how-questions were used to ask for reasons (Yin, 2009).

In instruments for teachers: Background questions about length of teaching and disciplines

Teacher questionnaires and interviews included only two background questions, one about the length teachers had been teaching and one about the knowledge domains they were teaching at the time of the study. The underlying claim for the question about length of teaching was that there is a relationship between educators' information literacy teaching and their teaching experience. It was used because other studies (e.g., Arenz, Huth, & Pfisterer, 2011; Lance, Rodney, & Russell, 2007; Lance, Rodney, & Schwarz, 2010; Purcell et al., 2012; Purcell, Heaps, Buchanan, & Friedrich, 2013; Williams, Grimble, & Irwin, 2004) and findings from the pilot study (section 3.5) revealed strong differences between less and more experienced teachers in their information literacy teaching. To ensure anonymity within Malotha School, which is a rather small institution, not more than four groups were used. The underlying claim for the question about subjects was that teachers' practices of information literacy teaching or collaboration are shaped by knowledge domains; indications for this were found in the literature (Arenz, Huth, & Pfisterer, 2011; Merchant & Hepworth, 2002; Probert, 2009; Purcell et al., 2012; Webber, Boon, & Johnston, 2005; Williams, Grimble, & Irwin, 2004; Todd, 2005b; Todd & Heinström, 2008; Todd, 2012) and in the pilot study (section 3.5). In order to guarantee anonymity of participants within their school, teaching areas from which participants could select were presented in five groups. Restraining the number of background questions also helped to ensure that participants could not be identified within their school and to make them feel more comfortable.

Terminology

From discussions with key informants at both the pilot site and Malotha School it became clear that teachers were not familiar with the term *information literacy*, even those actively involved in teaching concepts and competencies related to information literacy. Informants strongly recommended avoiding the term in instruments; this confirms the findings of other researchers. In the pilot study to her phenomenographic research about information literacy conceptions in universities, Bruce (1997) also found that tertiary educators were not familiar with the term *information literacy* so that she decided to use the term *information use* in her final study. In a more recent study about secondary educators' conceptions of student information literacy in Great Britain, Williams and Wavell (2007) realized that "the initial

data-gathering stage was the first occasion the majority of participants had encountered the term 'information literacy'" (p. 202). Based on Bruce's positive experiences in her final study, a first decision was taken to use the term *information use* instead of information literacy. But information use appeared too limited in the school context; teachers could have argued that learning is all about the use of information. And there were no reasons to leave out the other two aspects, location and evaluation of information, which are encompassed in the early ALA information literacy definition according to which "to be information literate, a person must be able to recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information" (American Library Association/Presidential Committee on Information Literacy, 1989). As the definition is widely accepted (Chevillotte, 2009, p. 2421; Eisenberg, Lowe, & Spitzer, 2004; Ingold, 2005, p. 32; Owusu-Ansah, 2003) and commonly used in research (Probert, 2008), a second decision was taken to expand the term and to employ *information location, evaluation, and use* in the questionnaires and in interviews.

Other decisions about terminology had to be taken. One concerned the distinction between *instruction* and *teaching*. Teachers might understand instruction as a form of teaching that is "teacher-centered rather than pupil-centered, and [that] tends to emphasize the passing on of received or established knowledge", a definition provided in *The Routledge International Encyclopedia of Education* (McCulloch, 2008, p. 317). Therefore, the more neutral word *teaching* was used. Another decision was about the distinction between *methods* and *strategies*. Although teachers seemed to understand the term *teaching methods* in pilot study questionnaires, the term they used spontaneously in interviews was *teaching strategies*. In order to stay closer to teacher jargon, the term used in the questionnaire implemented at Malotha was *teaching strategies*.

3.4.1.2 Questionnaire: Particularities and sample

First the particularities of the questionnaire as a research technique and the instrument will be described followed by a description of the sample.

Particularities

Following Pickard's (2007, p. 95) distinction between the term *survey* as "a research method" and a *questionnaire* as "a very specific data collection technique, which can be used within a

variety of research methods" the term *questionnaire* was used. All Malotha teachers were invited to participate in a paper-and-pencil version on a particular onsite professional development day during AY 2010/2011.

The questionnaire (Appendix 10) sought to gain a broad understanding of information literacy teaching in the Malotha faculty. It was administered before the individual interviews with teachers and helped to focus them. It offered the opportunity to collect data from all faculty members, and to "harvest data from a larger sample than would [have been] possible using any other technique" (Pickard, 2007, p. 183). It also ensured anonymity and confidentiality (Pickard, 2007, p. 183), issues of great importance to teachers, as was confirmed during the administration of questionnaires. Compared to mailed questionnaires, the onsite written questionnaire had the advantage that the investigator who administered it was available for answering participants' questions about items, which reduced the risk of misinterpretation (Miles & Huberman, 1994) and feelings of uncertainty. The possibility of administering an electronic version during the professional development day was discussed with key informants at the research site. For practical reasons, for example, loss of time due to the fact that teachers would have to go to their classrooms to use computers, a paper-based version was identified as being the only possible solution. Compared to electronic questionnaires, the paper-and-pencil version also had the advantage that all teachers could easily participate, regardless of their level of computer literacy (Miles & Huberman, 1994). A questionnaire should be "concise" and "short enough to be completed in a reasonable time" (Pickard, 2007, p. 185). Questionnaire implementation, including the arrival of teachers in two classrooms, introductory scripts, and questionnaire completion was achieved without any problems in the 40-minute time-frame offered by the school (Schedule in Appendix 11). The fact that the questionnaire was administered on a professional development day, when teachers were at the school anyway without having to do any teaching, reduced the risk that time was a barrier to participation.

As explained in the previous section, the questionnaire asked mainly open questions. Based on experiences in the pilot study (which are described in more detail in 3.5), it was decided to use "descriptive open-ended questions" only and no "list-style open-ended questions" (Dillman, Smyth, & Christian, 2009, p. 108) in the final version. They helped "to collect thick, rich ... information" (Dillman, Smyth, & Christian, 2009, p. 108), they "provide[d] ... research subjects with an opportunity to make their own comments about an issue, to tell ... precisely what is important to them about the topic" (Pickard, 2007, p. 195), gave them "an

immense amount of flexibility in the answer that [could] be provided" (Dillman, Smyth, & Christian, 2009, p. 108), and they also "require[d] a more detailed and personal response" (Pickard, 2007, p. 194).

In addition to background questions, questionnaires encompassed three parts: teachers' conceptions of information literate students, teachers' practices of information literacy teaching, and their practices of collaboration with the school library in the context of information literacy teaching. Questions about teaching in part three (questions 6 to 7.2.) and about collaboration in part four (questions 8 to 10) distinguished between "big research projects" and "other teaching strategies" because one of the major claims from the pilot study was that the scope of research tasks shapes information literacy teaching (section 3.5). This claim was confirmed at Malotha in preparatory, informal conversations with the two key informants and formal interviews with administrators and students, which all took place before the implementation of the questionnaire.

The yes/no questions (6, 7, and 8) that were placed at the beginning of new sections were not only meant to quickly guide teachers who had not been doing any information literacy teaching and/or collaboration through the completion of the instrument, they also gathered clear statements from all teachers that allowed to discover variation within the faculty. This variation was taken into account in the selection of participants for interviews, all of which took place after the implementation of the questionnaire.

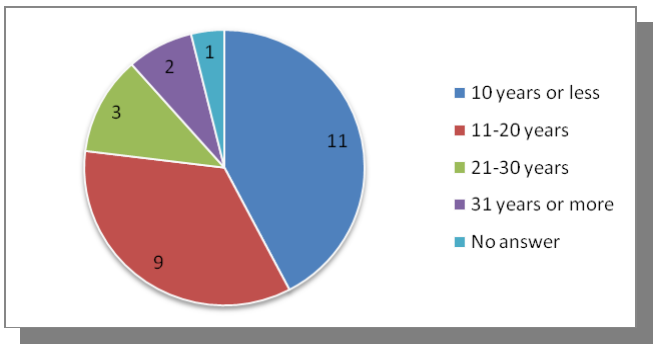
Questionnaire sample

The number of potential questionnaire participants was discussed with the Director of Studies. He identified 29 people to whom the questionnaire was "relevant", 27 out of the high school's 31 teachers and two out of four administrators who had a teaching assignment in addition to their administrative job. The four teachers who he considered as not being concerned by the questionnaire were either teaching subjects in which information literacy teaching was not relevant or they were absent for maternity leave. In total, 30 people participated in the questionnaire, which was implemented at the beginning of the professional development day. Although the Director of Studies had decided to inform ahead of time the teachers and other staff members who were not concerned by the questionnaire to arrive later, still four of them participated. They were staff members without teaching assignments who told the investigator and/or wrote on their questionnaires that they were not classroom teachers. These 4 questionnaires were not taken into account for the analysis.

Overall, 26 questionnaires were fully completed and used for the analysis, a response rate of 89.65%, which is high compared to other teacher questionnaires or surveys. In their study about teachers' information literacy in Scotland, England, and Wales, Williams and Coles (2003) noted that "predictably, teacher response rates were low (10.4% after prompt letters)" (p. 9), which meant only 312 out of 3000 teachers returned a usable survey. Response rates were higher for the other professional groups that took part in the study: 15.6% for head teachers, 31.2% for school librarians, 55% for Education Authority advisers, and 53.1% for school library services. Teachers, more than other professionals in the school context, are hesitant or too busy to participate in research. In their phenomenographic study about secondary school teachers' conceptions of their students' information literacy in the UK, Williams and Wavell (2006a) reported: "During ... early discussions, it became apparent that the target groups of teachers were fully committed to other initiatives and, however keen, felt unwilling or unable to get involved in further external activities" (p. 11).

Figure 3-3 shows the teaching experience of questionnaire participants expressed in years of teaching. Four groups were distinguished (Question 1 in Appendix 10). The largest group was formed by respondents who had worked as teachers at Malotha and other schools at the time of the study for 10 years or less; 11 out of the 26 participants were in this group. The second largest group encompassed nine respondents who had 11 to 20 years of teaching experience. Three respondents had been teaching for 21 to 30 years, two for 31 years or more, and one respondent did not answer that question.

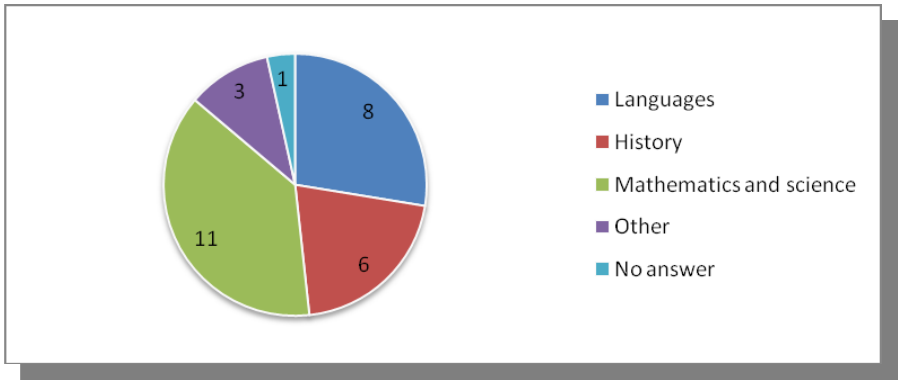
Figure 3-3: Length of Educators' Teaching Experience (Questionnaires)



Note. N=26

In the question about the subjects they were teaching at Malotha at the time of the study, teachers had the possibility to check more than one group if necessary (Question 2 in Appendix 10). Three teachers were teaching more than one subject. Figure 3-4 provides an overview.

Figure 3-4: Teachers' Subjects (Questionnaires)



Note. N=29

Mathematics and sciences were the two subjects taught by the largest group of questionnaire participants (11 out of the 26 teachers). It was decided to include the only participating computer science teacher in this group in order to protect his anonymity; he also taught science. Languages, including English, world languages, and classical languages, were taught by the second largest group that was composed of eight teachers. Six participants were teaching history, including subjects such as economics, geography, philosophy, psychology, and religion. Three teachers were teaching other subjects than the ones mentioned above, and one participant did not answer that question. The repartition of the individual participants among the subject groups is shown in Table 3-2.

Table 3-2: Repartition among Subject Groups (Questionnaires)

Subject groups	**Number of teachers**	**Teachers**
Languages	8	QT4, QT7, QT15, QT16, QT19, QT21, QT23, QT25
History	6	QT1, QT5, QT9, QT17, QT20, QT24
Mathematics and science	11	QT1, QT3, QT6, QT8, QT10, QT12, QT14, QT18, QT20, QT22, QT26
Other	3	QT9, QT11, QT13
No Answer	1	QT2
Total	**29**	

Note. N=29; QT... = Questionnaire Teacher ...

In the next section particularities regarding interviews and the samples will be described.

3.4.1.3 Interviews

The interview technique was the most important kind of data collection in this research. There are various types of research interviews and based on their structure, Merriam (2009) distinguishes between three: highly structured/standardized, semi-structured, and unstructured/informal (p. 89). The first and most structured type, with predetermined wording and sequence of questions, is used predominantly in research that is based on the quantitative methodology; in qualitative research, as in this study, it is commonly applied for asking background questions. The major characteristics of the third type of interviews, that is, informal conversations, are that they are not very structured as compared to the other two forms, their flexibility, and their exploratory nature. They are not only flexible regarding content but also regarding their settings, for example, time and place. They are predominantly used in case studies. In the research reported here, informal conversations were used especially in contact with key informants, the head school librarian and a teacher, in the early phase in order to explore the site and to prepare the formal phase of data collection and later, in parallel to formal data collection, they helped to identify potential participants for teacher interviews. Informal conversations with other Malotha staff members, that is, administrators, school librarians, and teachers, and with students were an important means for collecting data about the context of the case.

Semi-structured interviews, that is, "a mix of more and less structured questions" (Merriam, 2009, p. 90), were used for formal interviews with administrators (Appendix 4), students (Appendix 5) and teachers (Appendix 6). This is consistent with the underlying interpretivist paradigm and the qualitative approach in this study. These interviews encompassed a limited number of head questions, which were asked to all respondents, in interviews with teachers and students three, in interviews with administrators four, but the biggest part consisted of questions and issues that allowed exploration, and for them, neither the exact wording nor the exact order was determined in advance.

Another distinction between interviews, based on the number of respondents, is the distinction between "one-on-one interviews", with individuals as participants, and "focus group interviews", with groups as participants (Creswell, 2008, p. 226). Both were used in the present study, the individual approach was used with administrators and teachers, while the group approach was used with students. First, the features shared by both types will be explained and then the particularities and samples.

3.4.1.3.1 Shared features of formal interviews

Formal one-on-one interviews with teachers and administrators, and the formal focus group discussion with students had the following features in common: they are well-suited for qualitative, grounded case study designs; they encompassed opinion questions; because they were semi-structured, written guides were developed; and participants were selected through strategies of purposeful sampling with an emphasis on maximum variation.

Well-suited for qualitative studies

Yin (2009) emphasizes the crucial role of qualitative interviews in case study designs and Creswell (2008) notes that "many" researchers doing grounded theory studies "rely heavily on interviewing" (p. 442). Interviews do "provid[e] a unique access to the lived world of the subjects, who in their own words describe their activities, experiences and opinions" (Kvale, 2007, p. 9). Compared to other techniques, their strength is that they allow the investigator "to get to core issues in the case more quickly and in greater depth, to probe motivations, to ask follow-up questions and to facilitate individuals telling their stories" (Simons, 2009, p. 3). They are "the main road to ... multiple views of the case" (Stake, 1995, p. 64) because they "can be used to collect data from a large number of people representing a broad range of ideas" (Merriam, 2009, p. 88). As will be explained below, "maximum variation" was used as the major sampling strategy (Miles & Huberman, 1994, pp. 28-29; Merriam, 2009, pp. 78-79; Patton, 2002, pp. 234-235) in order to achieve this goal. Interviews are often used in library research (Pickard, 2007) as well as education research (Creswell, 2008); in the present study they were used in order to gain a deep understanding of Malotha teachers' practices of information literacy teaching and of their collaboration with the school library in this context.

Opinion questions

Opinion questions "aimed at understanding the cognitive and interpretative processes of people" (Patton, 2002, p. 350) were asked only in interviews. They sought to understand what educators think about student information literacy learning (in teacher interviews: Theme 2; in interviews with administrators and students: Theme 1).

Written interview guides

As interviews were intended to be semi-structured, written guides were developed, one for administrator interviews (Appendix 4), one for the focus group discussion with students

(Appendix 5), and one for teacher interviews (Appendix 6). Stake (1995) argues that the interviewer "needs to have a strong advance plan" (p. 64) and he should "arrive with a short list of issue-oriented questions" (p. 65). Interview guides encompassed three (for students and teachers) or four (for administrators) head questions that were asked to all participants, in order to ensure comparability of answers. For each of the head questions it listed a variety of thematic prompts, which were only used to react to respondents' answers, as well as general probes and follow-up questions, which could be used on need to invite a respondent to expand on a theme in greater depth (Merriam, 2009). The head questions and thematic prompts were developed based on research questions and conceptions from the literature (Miles & Huberman, 1994), as well as on pilot study findings (section 3.5).

Purposeful sampling and maximum variation

Purposeful sampling was used for within-case sampling, just as for the selection of the case, to identify "information-rich" participants (Patton, 2002, p. 230) who were able to provide deep insights into teachers' information literacy teaching. Sampling did not imply any concern about representativeness (Miles & Huberman, 1994; Stake, 1995). The study used a combination of various purposeful sampling strategies. The predominant one was achieving "maximum variation", a major sampling strategy in qualitative research (Miles & Huberman, 1994, pp. 28-29; Merriam, 2009, pp. 78-79; Patton, 2002, pp. 234-235) that was introduced in the 1960s by Glaser and Strauss (Merriam, 2009, p. 78). The aim was to cover "the *broadest scope of information* (the broadest base for achieving local understanding)" (emphasis in original) (Guba & Lincoln, 1989, pp. 177-178).

Maximum variation with regard to administrators was achieved in the sense that out of the school's four high school administrators the three who were closely involved with teachers (the principal, the administrator responsible for the curriculum, and the administrator responsible for technology) participated. The findings from the interview with the school librarian will be presented with those of administrators in order to protect her anonymity. Maximum variation was particularly important in the selection of teachers as it was not possible to interview all of them. Based on Miles and Huberman (1994, pp. 28; 34), the following types of cases were selected: "typical cases", that is, teachers who were considered as "average" or "normal" at Malotha with regard to their information literacy teaching; "disconfirming" or "atypical" cases, that is, teachers who did not collaborate with the school library in their information literacy teaching or who did not do any information literacy teaching at all; and "exceptional" and "extreme" cases, for example, Malotha teachers who

had achieved an unusually high level of collaboration or teachers who were especially knowledgeable about information literacy teaching in the context of small-scale research tasks. As explained above, length of teaching and subjects were considered as elements that could shape information literacy teaching. Hence it was also relevant to find several teachers from all age and all subject groups. Covering this broad range of perspectives helped to increase the dependability, and transferability of findings (Miles & Huberman, 1994).

Selection of participants was mostly iterative (Corbin & Strauss, 2008; Guba & Lincoln, 1989; Miles & Huberman, 1994); participants were identified after a preliminary analysis of the previously collected data. Their identification occurred through "snowball or chain" (Miles & Huberman, 1994, p. 28), in informal conversations with key informants (the school librarian and a teacher) and in formal interviews. However, participation was voluntary so that the willingness of potential interview participants to be studied was another selection criterion that was taken into account (Simons, 2009). There were potential participants who decided not to take part in the study.

3.4.1.3.2 One-on-one interviews: Samples

Formal one-on-one interviews were conducted with two groups of participants: administrators and teachers.

Administrators

Four administrators participated in interviews, including the head school librarian, for which findings are presented together with those from administrators in order to protect her anonymity. From experiences in the pilot study it was decided to interview the technology specialist at Malotha, where he is formally part of administration. The other two administrators were the principal and the administrator who was responsible for the curriculum at the time of study. Several questions (1 to 4.5 in Appendix 4) administered in written form prior to the interview provided some background information about participants. All administrators had worked in their current position exclusively at Malotha; Table 3-3 shows that two had been working in their position for 10 years or less, one for 11 to 20 years, and one administrator for 21 to 30 years, and thus it can be ascertained that they were familiar with the teaching practices at their school to varying degrees.

Table 3-3: Length of Experience in Their Position (Administrators)

Years in current position at Malotha and other schools	**Number of administrators**	**Years in position at Malotha**	**Number of administrators**
10 years or less	2	10 years or less	2
11-20 years	1	11-20 years	1
21-30 years	1	21-30 years	1
31 years or more	0	31 years or more	0
Total	4	**Total**	4

Note. N=4

At Malotha, it is common that administrators also have teaching assignments. Table 3-4 gives an overview.

Table 3-4: Administrators' Teaching Experiences

Background question	**Answer options or answers**	**Number of administrators**
Teaching certificate*	Yes	1
	No	3
Currently teaching*	Yes	3
	No	1
Subjects*	Computer science and library science	0
	Languages	0
	History	1
	Mathematics and science	1
	Other	0
	Not applicable	1
	No answer	1
Number of classes**	1 class	2
	5 classes (co-teaching)	1
	Not applicable	1
Number of class periods per week**	4	1
	5	1
	5 - 15	1
	Not applicable	1

Note. N=4; * = Questions with closed answers; ** = Questions with open-ended answers

Three administrators were teaching at the time of study. Two of them were working as classroom teachers, one of whom was teaching a subject that belonged to the history group, one a subject that belonged to the math and science group. Both of them were teaching one class, one four periods a week and the other one five. The school librarian did not have a classroom teaching assignment but regularly taught workshops or lessons to groups and classes of students. She considered herself as a teaching librarian and mentioned that she was co-teaching five classes during 5 to 15 periods per week. The fourth administrator, who was not teaching any classes at the time of study, emphasized in his interview that he had more than 30 years of classroom experience. Independent schools are free to define the

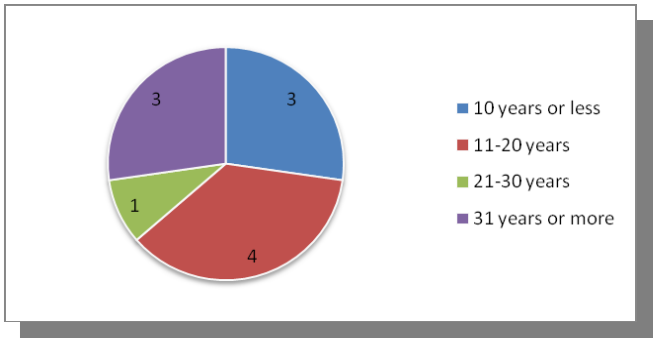
qualifications of their teachers (Bassett, 2004); teaching certificates are not required at Malotha and only one of the four administrators had one.

No data were collected about gender as it was not relevant for answering the research questions. Moreover, the fact that participants' gender was not disclosed helped to guarantee their anonymity within the school. As noted above, although both men and women took part in interviews, this report only uses masculine pronouns for referring to participants.

Teachers

During interviews, teachers repeatedly emphasized that they wanted to stay anonymous not only to people outside of their school but also to those within. Therefore, instead of describing the 11 teachers who participated in interviews individually and in great detail, as is common in qualitative case studies, only answers to the two brief background questions are reported. The first one was about the length of their teaching experience (Question 1 in Appendix 6). Eleven out of the 27 teachers who were identified by the Director of Studies as those to whom the study was relevant participated in one-on-one interviews, 40.74% of the faculty. As shown in Figure 3-5, four teachers had worked as teachers at Malotha and other schools for 11 to 20 years, three were less experienced and had been teaching for 10 years or less, another three were quite experienced, with 31 ore more years of teaching. One participant had worked as a teacher for 21 to 30 years.

Figure 3-5: Length of Educators' Teaching Experience (Interviews)



Note. N=11

The second background question was about the subjects that teachers were teaching at Malotha at the time of study (Question 2 in Appendix 6). Two educators were teaching more than one subject, one of them three different subjects and one two. The former was predominantly teaching science and subjects related to science, so that it was decided to present his results together with those from the science group. The other one was the only

computer teacher who participated. He also taught science, and in order to protect his anonymity, it was decided to present findings from his interview together with those from interviews with science teachers. Table 3-5 shows the repartition of interviewed educators among subject groups.

Table 3-5: Repartition among Subject Groups (Teacher Interviews)

Subject groups	**Number of teachers**	**Teachers**
Languages	5	Teacher A, D, G, J, K
History	2	Teacher H, I
Mathematics and science	4	Teacher B, C, E, F,
Total	**11**	

Note. N=11

Five interview participants were teaching subjects that belonged to the language group, four subjects that belonged to the math and science group, and three subjects from the history group, which included economics, geography, philosophy, psychology, and religion.

3.4.1.3.3 Focus group discussion: Rationale and sample

For the formal focus group discussion with students, first, a rationale will be presented followed by a description of participants.

Rationale

The pilot study showed that one piece was missing in order to gain a comprehensive understanding of teachers' information literacy teaching: the students' perspective. Informal conversations with students during the first onsite visit at Malotha in autumn 2010 showed that students felt more comfortable and talked more easily in a group setting, so it was decided to have a focus group discussion during the period of formal data collection in spring 2011. Patton (2002) also argues that "focus groups tend to be enjoyable to participants, drawing on human tendencies as social animals" (p. 386). Findings from the focus group discussion were used for triangulation and for the refinement of instruments for teacher questionnaires and interviews. There is no unanimity among writers about the ideal size: Patton (2002) suggests six to ten participants, while Creswell (2008) suggests four to six. In this case study six students participated. Interviewing in the group setting occurred in the form of a discussion during which participants were given enough time to interact with each other so that the data about the three head questions were socially constructed rather than

collected in the strict sense of the term (Merriam, 2009). Based on Patton (2002), the aim was not to achieve consensus but to give students the opportunity to "consider their own views in the context of the views of others" (p. 386). Limitations of focus group discussions are that they "require considerable group process skill" (p. 387) in order to make sure that no participants dominate the discussion and all contribute to it; from her ten years of experience as a classroom teacher, this investigator had learned how to deal with such situations. To encounter the risk that students with minority viewpoints might be hesitant to express their thoughts, great care was taken to create a respectful atmosphere. A major shortcoming of focus group discussions is confidentiality. Students signed an informed consent form (Appendix 2) and were informed verbally about confidentiality; however, although it was ensured from the investigator's side, it can never be ensured 100% from the participants' side with regard to each other (Patton, 2002, pp. 385-390).

Sample

Together with the school librarian it was decided to interview students who were 18 years old on the day of the interview, the age of majority in the USA. The school librarian then proceeded to select six students. Five students were 18 years old and could sign the informed consent form on their own; for the 17 year old student, the parents gave their written approval. Two other selection criteria for students were their willingness to talk and their opinions about the school library. The school librarian emphasized that she did "neither choose those who are not favorable to the school library nor those who are favorable to it a hundred percent" (Informal conversation with school librarian, spring 2011). She also tried to achieve variety in terms of success in the extended research project in grade 11 and regarding academic success in general. With regard to their success in the extended or big research project (BRP11), she selected two award-winning students, one student who also wrote a good paper but did not win an award, one with an average paper, and two students who did not get good grades on the research paper. With regard to academic performances in general, she did not ask any of the lowest performing students to participate, but "one or two very high-performing students and the others are somewhere in-between, some more towards the higher end, others more towards the lower end" (Informal conversation with school librarian, spring 2011).

Before the focus group discussion started, students were invited to answer four written background questions (Appendix 1). They were asked to write down their names (question 1) and then later to say them at the beginning of the discussion as soon as the recording had

started so that their contributions could be identified more easily during transcription. Students were all in grade 12 and all of them had also spent grades 9, 10, and 11 at Malotha (questions 2 and 3). The last background question was qualitative in format and invited them to describe themselves as students in two to three sentences.

Table 3-6: Students' Descriptions of Themselves as Students

Description	**Number of students***
Being a hardworking student	4
Enjoying learning	3
Having difficulties in some subjects	3
Being a good student	2
Being an information-rich focus group participant	1
Caring about other people and other people's opinion	1
Seeking help from teachers and peers when needed	1

Note. N=6; * For each description, each student's answers were only counted once

As Table 3-6 shows, four of the students described themselves as hardworking students. Three explained that they enjoy learning, either in particular subjects (for example, "science and math") or as one student said "learning about topics I might not understand". Three of them also said that they are encountering difficulties, either in particular subjects ("tend to struggle in math", "math and science") or more generally "sometimes have trouble focusing when I study". Two wrote that they are good students. One student emphasized that he considers himself as an information-rich focus group participant because he has "a good view about what teachers think and do in the classroom". One student mentioned that he cares a lot about other people's opinion. And one student wrote that he does "not hesitate to get help from teachers and peers" if he doesn't "understand a concept". In order to protect their anonymity within the school, statements are presented in this report with anonymized IDs, that is, Student 1, Student 2, etc.

3.4.2 Procedure of Data Collection

The first visit to Malotha School took place in autumn 2010; the purpose, content, and schedule of the study were discussed with the head school librarian and a principal, and approval received for the school's participation. Informal conversations with administrators, school librarians, teachers, and students helped to prepare the formal phase of data collection scheduled for spring 2011. This first onsite contact had been preceded by the gathering of

documents available on the school's website, which continued in the following months up to the next visit through contacts with the school librarian who mailed various print documents. An overview of data collection at Malotha is provided in Table 3-7.

The formal phase of data collection took place during three successive weeks in spring 2011; given the relatively large distance between Malotha School in the USA and the home of the investigator in Germany, it was not possible to spread data collection over a longer period. However, in order to reduce the risk of bias due to "the effects of the case on the researcher" (Miles & Huberman, 1994, pp. 265-266), in any given week, interviews were scheduled on two days, if possible two consecutive ones, so that more days were spent offsite, and weekends helped to prolong offsite periods.

Formal data collection began with administrator interviews followed by the focus group discussion with students, which all took place before any data were gathered from teachers. The aim was exploring the external perspective on teachers' information literacy practices first and gaining a broader insight into the context of the case. Based on these findings, instruments were refined for the teacher questionnaire and interviews.

The first formal collection of data from teachers took place at the end of the first week with the implementation of the questionnaire on one of Malotha's onsite training days. It was scheduled before interviews so that preliminary findings helped to refine interview guides. This site visit was also used as an opportunity to identify teachers who were ready to participate in interviews. Teachers had been invited to participate in the questionnaire through emails sent by the Director of Studies, which included the schedule of the professional development day (Appendix 11) and a brief explanation about the questionnaire. For the completion of questionnaires, participants were divided into two groups based on last names (A to L in one room and M to Z in the other one). Classrooms were located next to each other and had windows reaching to the corridor so that the investigator, who stayed alone with the two groups, was able to be in contact with teachers and to answer questions when needed. The whole process from teachers' entrance in classrooms to the disposal of the last questionnaires lasted 40 minutes.

Table 3-7: Data Gathering at Malotha

Time in year and place	Day	Time of day, place at Malotha, technique, and participant
Autumn 2010: First visit to Malotha (1 day)	/	Meeting with principal, school librarian, and key teacher informant; informal conversations with administrators, library staff, teachers, and students
Autumn 2010 (From Germany)	/	Collection of documents (downloaded from website, documents in print format mailed by school librarian)
Spring 2011: Week 1 at Malotha	Day 1	*(Not at school)*
	Day 2	11.30 am (library*): Interview with Administrator D 1.15 pm (library): Interview with Administrator B 2.15 pm (classroom): Meeting with key teacher informant
	Day 3	11 am (his office): Interview with Administrator A 11.55 am (his office): Interview with Administrator C 1.45 pm (library): Focus group discussion with the six students
	Day 4	*(Not at school)*
	Day 5	9.25 am (2 classrooms): Faculty questionnaire *(Professional Development Day)*
Spring 2011: Week 2 at Malotha	Day 1	*(Not at school)*
	Day 2	*(Not at school)*
	Day 3	10.30 am (his classroom): Interview with Teacher A 1pm (his classroom): Interview with Teacher B 2 pm (library): Interview with Teacher C 3 pm (library): Interview with with Teacher G
	Day 4	9.15 am (his classroom): Interview with Teacher D 12.15 pm (his classroom): Interview with Teacher E 1.45 pm (his classroom): Interview with Teacher F
	Day 5	*(Not at school)*
Spring 2011: Week 3 at Malotha	Day 1	8.15 am (his classroom): Interview with Teacher H 2 pm (library): Interview with Teacher I 3.15 pm (his classroom): Interview with Teacher J
	Day 2	*(Not at school)*
	Day 3	10.30 am (library): Interview with Teacher K Afterwards (library): Last meetings with principal and school librarian
	Day 4	*(Not at school)*
	Day 5	*(Not at school)*

Note. * Library = in a separate room there

Teacher interviews took place in the second and third week. It was originally planned to have at least one or two hours of free time between interviews for filling in the contact summary form and noting first thoughts, but, as the pilot study had shown, scheduling interviews with teachers required flexibility on the investigator's side, so that it was accepted to do two or three interviews consecutively. Some flexibility was also needed regarding the length of interviews. Most teachers preferred to be interviewed during breaks and considered the suggested 60 minutes as too long in their busy working day, so it was decided to accept whatever time frame a teacher could offer with the consequence that not all interviews were of equal length.

Every onsite day at Malotha included informal conversations and the gathering of more documents about the context of the case. The informal conversations also served the purpose of identifying more teachers who could be invited to participate in interviews, which took place either in a separate room in the library or in the participants' office or classroom. In order to make them feel as comfortable as possible, it was left up to them to decide on the place.

Introductory and closing scripts for interviews are found in the written guides in Appendices 4 through 6. At the beginning of interviews, after the investigator had thanked participants, they had time to read the informed consent form, were invited to sign it and to complete the background question. Then they were given a handout with the three or four head questions (Appendix 7) to make sure that they understood them and to give them the opportunity to reread them as needed. Handouts were collected at the end of the interview, so that they did not circulate in the school. Respondents were informed that equal time should be spent on each head question.

Recording interviews not only helped to enhance the investigator's concentration on the interview process and participant, it also increased accuracy (Simons, 2009). All participants agreed to be recorded. Table 3-8 gives an overview of interview participants and the length of interview recordings. Time frames suggested by participants for one-on-one interviews ranged from 15 to 50 minutes; the actual interviews lasted between 12 and 42 minutes. The recording of the focus group discussion was slightly more than 59 minutes. All respondents were thanked at the end of the interview for their participation.

Table 3-8: Overview of Interview Recordings

Group of participants	Interview participants	Length of interview recording
Administrators	Administrator A	00:36:53
	Administrator B	00:39:37
	Administrator C	00:13:59
	Administrator D	00:39:36
Students	6 students (focus group discussion)	00:59:16
Teachers	Teacher A	00:32:18
	Teacher B	00:35:42
	Teacher C	00:33:01
	Teacher D	00:12:28
	Teacher E	00:24:06
	Teacher F	00:24:56
	Teacher G	00:18:44
	Teacher H	00:36:49
	Teacher I	00:42:14
	Teacher J	00:35:57
	Teacher K	00:38:00

In qualitative research designs, data collection cannot be separated from data analysis, which "begins with the collection of the first pieces of data" (Corbin & Strauss, 2008, p. 47) and then should be done throughout (Miles & Huberman, 1994; Simons, 2009). Analytical procedures, including those used in the early stages, will be described in section 3.6.

3.5 Pilot Study

This section describes the pilot study. First, it explains its purpose; then, it provides a rationale for the selection of the school and the participants within the school and briefly describes them. The section concludes with a reflection on the lessons learned for the study at Malotha.

3.5.1 Purpose of the Pilot Study

A major purpose of the pilot study, which took place in winter 2010, was to develop, test, and refine procedures and strategies of data collection and analysis (Yin, 2009). In case study research, Yin argues, the pilot study "is not a *pretest*" (emphasis in original) (p. 92), rather it should be considered as a laboratory, where one can try things, that is, try variations. Therefore, getting detailed feedback from participants was crucial. With regard to data collection instruments, semi-structured one-on-one interviews were tested with administrators and teachers in terms of content, wording, format, and sequence of questions. Stake (1995) emphasizes that "trying out the questions" is pivotal (p. 65). The questionnaire that was

developed respected the conditions at Malotha School, the required time frame (30 minutes) and format (paper and pencil) and was tested with teachers from the English department in terms of content, wording, format of questions as well as time needed. The pilot study also served to identify the type of teacher-developed documents that could be used as the third technique for triangulation. Consistent with the interpretative paradigm on which this study is based and the qualitative methodological approach, according to which educators' information literacy teaching was addressed from participants' perspective, questions in all pilot instruments were based on preliminary research questions and conceptions from the literature (Miles & Huberman, 1994) but kept broad enough to leave room for exploring respondents' conceptions, experiences, and interpretations of their worlds (Kvale, 2007; Patton, 2002; Pickard, 2007). Regarding analysis, the aim of the pilot study was not developing a comprehensive picture of teachers' information literacy teaching practices at that particular school but identifying appropriate strategies. However, the preliminary findings, which evolved during that process, helped to refine the instruments used at Malotha.

3.5.2 Selection and Description of Pilot Study Participants

Yin (2009) explains that the reasons for selecting the pilot case can be "unrelated to the criteria for selecting the final cases" (p. 92). For practical reasons, one criterion of selection was "geographic proximity" (p. 93), other criteria included the use of English as the primary language of teaching and educators who were native English speakers. The school site chosen for the pilot study was an international school located in a bigger city in Germany. It was selected over other international schools because issues related to information literacy teaching, such as independent inquiry and critical thinking, were central parts of its philosophy and mission statement. Another criterion was access (Yin, 2009). The principal approved the school's participation in the pilot study and six staff members, the associate principal, the school librarian, the director of technology, and three teachers from the English department who were teaching in the high school division (grades 9 through 12), including the head of department, agreed to participate in interviews. The three teachers together with eight other English teachers also completed the questionnaire.

The pilot school is a college-preparatory school with approximately 850 high school students; 80% of their graduates go to university. Admission to the school is competitive and selective, but one of the administrators explained that the school admits students from a variety of social backgrounds. The high school division has a well-equipped library: at the time of study, it was

run by a full-time working certified school librarian who had arrived at the school shortly before the pilot study started. She was supported by two full-time assistants who had no qualifications in library and information science or related fields. The new librarian estimated that the collection encompassed about 60,000 books in addition to a variety of media in other formats, such as DVDs and CD-ROMS, for which she was not able to provide exact numbers. They had 25 subscriptions to journals, and one to a database. Their budget was 10,000€ a year. In addition to the 14 computers in the main library room, two of the school's three computer labs with about 40 computers were accessible through the library only; all had wireless internet access. The library offered flexible scheduling. It was open every school day from 7:45 am to 4:00 pm. As far as information technology in the rest of the building is concerned, the school wanted to finish by the end of the school year the process of equipping each of their more than 60 classrooms with at least a TV or beamer together with a laptop. They offered wireless coverage for teachers all over the campus, for students in the main building and in front of the building, and had other technology, such as scanners, printers, digital cameras, and video editing software available for student use.

3.5.3 Reflection on the Pilot Study

A thorough analysis of answers and comments in the questionnaire and interviews as well as evaluative discussions with participants after data collection helped to improve instruments for the final study at Malotha.

Decisions regarding terminology in data collection instruments

Pilot study interview participants strongly suggested during interviews renouncing on the term *information literacy*. They argued that probably teachers do a lot of information literacy teaching without being familiar with the term. Teachers might be led to think about school libraries and databases only, whereas information literacy also encompasses other aspects, so that teachers who teach information literacy without using the school library would be excluded. Participants agreed that *information location, evaluation, and use* would be a better term. Other decisions regarding terminology were the replacement of *teaching methods* by *teaching strategies*, and *collaborate with the school library* by *work with the school library* in order to stay closer to teacher jargon.

Decisions regarding content and format of data collection instruments

In questionnaires, several questions were deleted because teachers did not understand them. Others were combined because teachers themselves considered them as repetitive or because analysis revealed that participants provided the same answers. The test of "list-style open-ended questions" as opposed to "descriptive open-ended questions" (Dillman, Smyth, & Christian, 2009, p. 108) showed that the former produced answers that would be too short to allow an in-depth analysis. Therefore, it was decided to use descriptive open-ended questions only in the final version of the questionnaire.

Decisions regarding data collection procedure

Teachers were able to complete the questionnaire within the given time frame of 30 minutes and accepted the (paper-and-pencil) format. However, it appeared to be useful to have some ballpoint pens available. In order to make participation as easy as possible, the questionnaire was implemented during one of the weekly meetings of the English department. The high response rate, 11 out of 12 teachers decided to participate, confirmed the decision to administer the questionnaire on a professional development day at Malotha.

The school librarian's suggestion to interview the director of technology appeared to be especially useful so that the decision was taken to do the same at Malotha. During data analysis it also became clear that the students' perspective was missing. In the final study at Malotha data were collected from them as well. Based on the lessons learned from the pilot study, the following sequence was developed for data collection at Malotha: gaining an external perspective on educators' information literacy teaching practices first from interviews with administrators (the principal, the director who was responsible for the curriculum, the school librarian, and the technology specialist) and students, then discovering the internal perspective, first in the form of a broad understanding gained from a questionnaire to which the whole faculty would be invited, and afterwards a deep understanding through interviews with individual teachers. It was also learned that interviewing teachers during their busy school days required some flexibility. But a major decision was about the interview process. At Malotha a much more systematic approach would be used. Prior to interviews, participants would provide information about their backgrounds in written format through a small number of closed-ended questions. Every participant would be asked the same three head questions and equal time spent on each of them so that comparability of answers was guaranteed. Pilot

study sub-questions were transformed into prompts and follow-up questions, which would be used only to dig deeper into respondents' answers.

Decisions regarding collection of documents

Documents about the school in general that were needed for discovering the context of the case were available predominantly on the school's website. The associate principal emphasized that the pilot school does not rely on print documents much anymore. The pilot study also showed that it was difficult to access documents developed by individual teachers, such as assignments or handouts for particular research projects. It was decided to discuss the issue with key informants at Malotha and to find out if it would be possible to access this type of documents more easily there.

Decisions regarding analysis

Tools for early analysis were developed and tested. First, contact and document summary forms were developed (based on Miles & Huberman, 1994), and then transcription rules for questionnaires and interviews. Doing selective transcripts was tested with one interview but discarded because of the risk of ignoring passages that might become important in later stages of the analytical process. At Malotha, all interviews would be transcribed completely. Because the investigator's native language is German, it was decided to have them done by a transcription service in order to prevent mistakes due to listening problems. Also, transcription secretaries were supposed to be more familiar with informal expressions. The investigator, who was more familiar with LIS terminology, would thoroughly double-check all transcripts. In the pilot study, two services were tested, one in the UK and one in the USA; the US service was retained for the final study because their transcripts had more text passages that were understood correctly and fewer blanks. Then, rules for member check were developed and interviews sent back to three out of the six interview participants, that is, one administrator and two teachers. Only the administrator reacted to the request. Nevertheless it was decided to also invite final study participants to review the transcripts of their interviews. Rules were also developed for the anonymization of all types of sources, and software selected for supporting the analytical procedure, MAXQDAplus, into which all questionnaire and interview transcripts as well as documents were imported. A major decision regarding analysis was the use of Bruce's (1997) information literacy model as a sensitizing concept. As the analysis of the pilot data progressed, it became clear that the information literacy concepts that emerged out of the data could be related easily to most of the seven information literacy

conceptions in her model. Thus, the categories that had been developed so far were reorganized, using her seven conceptions as labels. Another decision pertained to data display; it was decided to use matrices and diagrams as the main visual tools.

Preliminary findings

The aim of the pilot study was to test procedures of data collection and analysis, not the development of a comprehensive picture of educators' information literacy teaching in the pilot school. Several preliminary claims were developed for the information source conception and the information process conception. More importantly, indications were found that the scope of research tasks shape teachers' information literacy teaching practices. Administrators (external perspective) and teachers (internal perspective) clearly distinguished between information literacy teaching and learning in the context of extended projects (especially in the form of the three- to four-month-long research projects that English teachers assign in grades 10 through 13), and small-scale projects. Therefore it was decided to discern the two types in the questionnaire destined to Malotha teachers (see Appendix 10: questions 6, 6.1., 6.2 about information literacy teaching and learning and question 9 about collaboration in big projects, and questions 7, 7.1, 7.2 about information literacy teaching and learning and question 10 about collaboration in other situations). Pilot study participants, again administrators as well as teachers themselves, also reported on practices of information literacy teaching and collaboration with the library depending on knowledge domains, so that it was decided to keep the background question about subjects (Question 2 in Appendix 3; Question 2 in Appendix 10). Several indications were also found for educators' information literacy teaching being influenced by the length of their teaching experience so that it was decided to keep the corresponding question in Malotha instruments (Question 1 in Appendix 3; Question 1 in Appendix 10).

3.6 Data Analysis

This section describes the procedures of analysis employed for the data gathered at Malotha. Merriam (2009) argues that in addition to answering the research questions, the main concern of data analysis in case studies is "conveying an understanding of the case" (Merriam, 2009, p. 203), that is, developing a theory. It "would not be a theory abstracted from the case but rather a theory of the case itself that explains or interprets it" (Simons, 2009, p. 168). The present study was designed to develop a theory of educators' information literacy teaching at

Malotha High School, based on their conceptions of information literacy learners and learning, the information literacy competencies encompassed in the research tasks they assign, the pedagogical interventions they use, and their collaboration with the school library and librarian. Yin (2009) suggests that the investigator first develops "an overall analytic strategy" (p. 127). Consistent with the interpretivist paradigm and the qualitative methodology on which it was based, this case study used an inductive approach that relied heavily on grounded theory, and more precisely on the systematic procedures developed by Corbin and Strauss (2008). This section describes the analytical strategies employed, beginning with those for early analysis, followed by those for data reduction and display, and finally those for conclusion drawing.

3.6.1 Early Analysis

Analyzing the data began with the gathering of the first piece of data and continued in parallel with the data collection (Miles & Huberman, 1994; Simons, 2009). Because of the geographical distance between the investigator's home in Germany and the final study site in the USA, it was not possible to follow the grounded theory approach in the strict sense and to alternate between data collection and in-depth analysis (Corbin & Strauss, 2008). The formal phase of data collection lasted three weeks, during which longer offsite phases were used to do a preliminary analysis of the previously collected data; it provided the investigator with the "possibility of collecting new data to fill in gaps" and allowed her "to test new hypotheses that emerge[d] during analysis" (Miles & Huberman, 1994, p. 50). This subsection describes, separately for each data collection technique, the steps from the reception of the raw data up until the moment when they were imported into the software MAXQDAplus, which supported the analytical process. Table 3-9 provides an overview.

Documents

For each document, a summary form (Appendix 9), which had been developed during the pilot study based on Miles and Huberman (1994), was completed with background information about each document (the type of document, from whom and when it was received, the author, the audience, and the date of publishing), with a brief summary of contents, and with things that appeared to be salient, interesting, illuminating, or important. The next steps comprised selecting the documents for preliminary and later for in-depth analysis, scanning the ones that were available only in printed format, refining the

anonymization rules (Appendix15) that were developed during the pilot study, anonymizing documents, and importing them into the computer program that supported the analysis.

Table 3-9: Steps of Early Analysis

Data collection technique	For documents	For questionnaires	For interviews
Analytical steps	Completing document summary forms*	Writing up field notes	Completing contact summary forms* and writing up field notes
	Selecting documents for analysis	Transcribing questionnaires (investigator)**	Preliminary analysis
	Preliminary analysis	Proofreading transcripts (investigator)	Transcribing interviews (transcription service)**
	Scanning selected printed documents	Preliminary analysis	Double-checking transcripts (investigator)
	Anonymizing documents**	Anonymizing transcripts**	Member check**
	Importing anonymized documents into computer program	Importing anonymized transcripts into computer program	Anonymizing transcripts**
			Importing anonymized transcripts into computer program

Note. * Forms developed during pilot study (Appendices 8 and 9); ** According to rules developed in pilot study and refined in final study (Appendices12, 13, 14, 15)

Questionnaire

Immediately after the implementation of the questionnaire, field notes were written up. The offsite days that followed were used for refining the transcription rules (Appendix 13), which had been developed during the pilot study, and for typing teachers' handwritten answers verbatim into the spreadsheet application Excel. Questionnaires were transcribed by the investigator, who also proofread them. The findings of the preliminary analysis that followed were used for refining the guides for teacher interviews. Later, transcripts were anonymized using the rules described in Appendix 15 and imported into the software MAXQDAplus.

Interviews

This section is about formal interviews, one-on-one and focus group; it is not about informal interviews or conversations, for which a contact summary form was also completed but not imported into the computer program.

"Within a few hours" after each formal interview (Stake, 1995, p. 66), notes taken during the contact were used for completing a contact summary form (Appendix 8), which was developed during the pilot study based on Miles and Huberman (1994), and that allowed to record some basic information (name of the informant, place, date, and time of the interview), a summary of the main issues covered, things that struck the investigator or which she considered to be especially salient, interesting, illuminating, or important in that particular contact, and new or remaining questions. The preliminary analysis of interviews was used for identifying the next interview participants with the goal of achieving maximum variation (Miles & Huberman, 1994; Merriam, 2009; Patton, 2002; Stake, 1995).

All interviews were transcribed verbatim, and at the end of each onsite day, new recordings were sent to the transcription service. Kvale and Brinkmann (2009) qualify transcribing as "an initial analytic process" (p. 180) that involves a number of choices that "will depend on the intended use of the transcript" (p. 181). The aim of this research was neither "a detailed linguistic [nor a] conversational analysis" but "reporting the subject's accounts in a readable public story" (p. 181). Therefore, the decision was made to use written style that is more formal. Another reason that supported the choice was the fact that transcripts would be sent to participants for member check and Kvale and Brinkmann explain:

> Some subjects may experience a shock as *a consequence* of reading their own interviews. Oral language transcribed verbatim may appear as incoherent and confused speech, even as indicating a lower level of intellectual functioning. ... If the transcripts are to be sent back to the interviewees, rendering them in a more fluent written style should be considered from the start. (emphasis in original) (p. 187)

The reliability or consistency of transcripts was enhanced through high-quality recordings in which all passages were audible, and through the development of clear transcription rules (Appendix 14), which were forwarded to the transcription service (Kvale & Brinkmann, 2009, pp. 180-187). Still, transcribing always involves interpreting; Kvale and Brinkmann note that "even the exact same written words in a transcript can convey two quite different meanings, depending on how the transcriber chooses to insert periods and commas" (p. 185). All transcripts provided by the transcription service were thoroughly double-checked by the

investigator, who listened to recordings while reading transcripts, completed blanks, corrected errors, and eliminated inconsistencies in punctuation (Merriam, 2009).

With regard to internal validity or credibility of transcripts, the question was if they matched with "the multiple realities existing in ... [participants'] minds" (Guba, 1981, p. 80). In order to enhance the credibility of interview transcripts, member checks were used (Guba, 1981; Miles & Huberman, 1994; Yin, 2009) by inviting each interviewee to proofread the transcript of his interview. The email, explaining the reasons and outlining the criteria (Simons, 2009), is added to this report in Appendix 12. Five out of the 15 participants in one-on-one interviews reacted: Three participants (Administrator A, Teacher C, and Teacher H) wrote that their transcripts did not need any changes, two other participants (Teacher D and E) announced their feedback but finally did not send it, and another two (Administrator B and D) made some additions, which consisted mainly of completing blanks or providing further examples. All these changes can be traced as they were added to the original transcripts within parentheses. No request for member check was sent to students for reasons of confidentiality as they had been interviewed in a group setting. Then interview transcripts were anonymized according to the refined rules from the pilot study (Appendix 15) and imported into the computer program.

3.6.2 Three Main Activities

Informal conversations and documents helped to understand and describe the context. Documents included the copies of assignments to research projects that a minority of teachers (four out of eleven) handed out during their interview; in order to maintain the comparability of findings, they were not utilized for exploring the case and phenomenon as such. For this purpose, only the information gathered in questionnaires and interviews was used. The strategies employed for the in-depth analysis of the latter two are described in the following subsections. It encompassed three strategies, which formed an interactive, iterative, and cyclical process: data reduction, display, and conclusion drawing (Miles & Huberman, 1994).

3.6.2.1 Data reduction

Reducing the data encompassed selecting, discarding, focusing, simplifying, organizing, abstracting, and transforming the data (Miles & Huberman, 1994) and was completed through coding, counting, the identification of categories, including a core category, the formulation of claims, and writing summaries (Corbin & Strauss, 2008; Miles & Huberman, 1994).

Coding began with four thematic rounds. In the first round, segments with contextual information were identified and labeled in all interviews and questionnaires. The next three rounds were completed for each technique separately, first for interviews and then for questionnaires. Each round focused on one of the following three themes: educators' conceptions of student information literacy learning, their practices of information literacy teaching, and their practices of collaboration with the school library. Table 3-10 shows in which parts of the instruments segments were expected. As respondents also provided relevant information in other parts of the instruments, each time the entire interview or questionnaire was worked through, not just the parts mentioned in the table. As a result of analysis, later in the process *teachers' practices of information literacy teaching* was replaced by *information literacy skills encompassed in the research tasks teachers assign* and *pedagogical interventions*, the distinction could not be made at this point.

Table 3-10: Thematic Coding Rounds

Thematic coding rounds: Searching for information about	**Questions in questionnaires***	**Themes in guides***		
		Interviews with administrators, incl. librarian	**Student focus group discussion**	**Interviews with teachers**
Context	All questions	Theme 3	All themes	All themes
Teachers' conceptions of student IL learning	3, 4, 5, 6.2, 7.2, 13	Theme 1	Theme 1	Theme 2
Teachers' practices of IL teaching	6, 6.1,7, 7.1, 13	Theme 2	Theme 2	Theme 1
Teachers' practices of collaboration with the library	8, 9, 10, 11, 12 , 13	Theme 4	Theme 3	Theme 3

Note. * = The parts where the most pieces of information were expected, but in each round the other parts were also read through (in all questionnaires and all interviews)

Open coding and axial coding were used in each of the thematic rounds (Corbin & Strauss, 2008). Open coding meant "breaking data apart and delineating concepts to stand for blocks of raw data" and "qualifying those concepts in terms of their properties and dimensions" (p. 195). Axial coding occurred in parallel; it helped to identify relationships between concepts and to group them into categories and to identify relationships between categories and to group them under broader categories (pp. 198-199). Appendix 17 provides an overview of the information literacy categories that emerged out of the data.

Coding was not completely open as it began with a provisional list that was developed from the research questions, the questions in data collection instruments, and Bruce's (1997)

information literacy model (Miles & Huberman, 1994). But it was open in the sense that the list and especially the information literacy model were used "to enhance sensitivity" and "to stimulate questions during the analysis" (Corbin & Strauss, 2008, p. 37). The list changed repeatedly during the process: labels were refined or discarded and new labels were added and grouped differently (2009). When new codes or categories emerged out of the data later in the analytical process, a deductive approach was used and all the data were searched for this particular code or category (Kuckartz, 2010).

Bruce's (1997) relational information literacy model was described in more detail in Chapter 2. She developed it as an alternative to the widespread behavioral models. She understands her relational approach as "describing information literacy in terms of the varying ways in which it is experienced by people, that is their conceptions" (p. 39). In a phenomenographic study with 60 participants (librarians, lecturers, staff developers, and counselors) from eight universities she identified the following seven information literacy conceptions: (1) the information technology conception, (2) the information source conception, (3) the information process conception, (4) the information control conception, (5) the knowledge construction conception, (6) the knowledge extension conception, and (7) the wisdom conception. Findings in the pilot study suggested the use of her model as a sensitizing frame. It was selected over other information literacy models because it is based on research, it is widely recognized and frequently cited by LIS professionals around the world (Andretta, 2012; Chevillotte, 2009; Herring, 2010; Ingold, 2005; Rauchmann, 2009), it covers a wider range of information literacy components than other research-based models, for example, Kuhlthau's ISP (Kuhlthau, 2004) who had another focus, and because educators, although tertiary, were part of her sample (18 out of the 60 participants). Also, it has been used for similar endeavors in other studies in secondary schools, for example, in Merchant and Hepworth's investigation about teachers' and students' information literacy (Merchant & Hepworth, 2002).

The predominant types of codes used were factual codes, mainly for contextual information, thematic codes, in order to point towards concepts, phenomena, and events (Kuckartz, 2010) related to the research questions and Bruce's information literacy model, and pattern codes that "pull together a lot of material into more meaningful and parsimonious units of analysis" (Miles & Huberman, 1994, p. 69) and were used for grouping codes into categories. When the words of participants appeared to be clearer than any label that the investigator could think of, in-vivo codes were utilized (Corbin & Strauss, 2008). The screenshot in Appendix 16 shows how the data were coded with the computer program MAXQDA.

Several of the "thinking techniques" (p. 65) suggested by Corbin and Strauss (2008), which are meant to enhance the coding procedure and to help the investigator to explore the variety of concepts, were employed. Central to this study was the technique of making constant comparisons of data segments for similarities and differences. It served a twofold purpose: on the one hand, it was used as a means to explore the properties and dimensions of a code or concept (p. 74), and on the other hand, it permitted the identification of similar concepts and grouped them under a category (p. 73) or pattern codes (Miles & Huberman, 1994). Also important were theoretical comparisons in the sense of making comparisons of data segments with the literature (pp. 74-75), especially with Bruce's (1997) information literacy model but also with other conceptions found in the literature (Chapter 2). Other thinking techniques suggested by Corbin and Strauss (2008) that were followed during the coding procedure included considering the different meanings of a word, looking for metaphors, as well as asking questions about the data and considering the possible answers, which helped to look at an issue from the participant's perspective (pp. 78-85). Different types of questions were used: temporal questions, for example, *How much time did the research project that a teacher assigned take?*; what- and how-questions; who-questions, for example, *Who taught the class about the location of web sources, the librarian or the teacher?*; spatial questions, for example, *Where did the teacher teach evaluation of sources, in the classroom or in the library?*; and questions about the relationships between concepts allowed for their systematic categorization (pp. 69-73).

The data were also reduced through writing memos, counting, and writing summaries. Memos, that is, "written records of analysis" (Corbin & Strauss, 2008, p. 117), helped to explore ideas and thoughts about concepts and categories (Creswell, 2008). In order to avoid bias, to remain "analytically honest", and to judge about the robustness of claims (Miles & Huberman, 1994, p. 253), the number of transcripts in which a particular concept was found was counted. In the report about findings (Chapter 4), each of the four subsections about a research questions ends with a summary.

3.6.2.2 Data display

Circle diagrams, bar charts, and tables were used to display the quantitative data, such as participants' background. Matrices and diagrams were developed for the qualitative data, which were by far the most encompassing in this study. They followed the principles suggested by Miles and Huberman (1994) and served for organizing concepts and categories

and presenting them in a short and systematic way. The major types employed were conceptually ordered and role ordered. As their name indicates, the former are organized around concepts. They were used for capturing the properties and dimensions of concepts. The example below (Table 3-11) shows the frame of a matrix that displayed participants' descriptions of research tasks. The cell entries were typically quotes, labels, short summarizing phrases, or a combination of each. The development of conceptually-ordered matrices is described on the basis of a concrete example in Appendix 19.

Table 3-11: Exemplary Conceptually Ordered Matrix

Properties	**Dimensions**	
	Extended research tasks	**Small-scale research tasks**
Size of product		
(Class) Time		

Role-ordered-matrices helped to organize the data about and from teachers according to roles: administrators and students who reported about teachers (external perspective) and teachers talking about themselves in questionnaires and interviews (internal perspective). Most of the time, the columns were used for information literacy categories or their subcategories, as shown in the exemplary Table 3-12 below. The rows were used for the roles, sorting the data in this way supported the triangulation of sources (administrators, students, and teachers) and techniques (teacher interviews and questionnaires). Cell entries were numbers, concepts, or quotes, or a combination of those. For both types of matrices the data were written into the cells according to the decision rules outlined in Appendix 18.

Table 3-12: Exemplary Role-ordered Matrix

Perspective	**Role**	**Types and elements of information presentation**
External	**Administrators**	
	Students	
Internal	**Teacher** *(Questionnaire)*	
	Teacher *(Interviews)*	

The development of detailed role-ordered matrices and their evolution towards summarizing matrices is described on the basis of a concrete example in Appendices 20 and 21

respectively. The main aim of data displays was facilitating the drawing of valid conclusions (Miles & Huberman, 1994), which will be explained in the next section.

3.6.2.3 Conclusion drawing

The main aim of conclusion drawing in grounded theory is the development of a theory, which is "a construction built by the analyst from the data provided by participants" (Corbin & Strauss, 2008, p. 266). It is a "middle range theory" (Creswell, 2008, p. 445) or "a substantive theory – theory that applies to a specific aspect of practice" (Merriam, 2009, p. 200) as opposed to "'grand' theories … that apply to many people and situations" (Creswell, 2008, p. 445).

A major step towards theory development is the identification of a core category (Creswell, 2008). Corbin and Strauss (2008) refer to its selection as part of "integration" and define the "core" or "central" category as "the main theme of the research ... that all other concepts will be related to" (pp. 84; 104). They suggest two ways for its selection, either choosing one of the categories that were identified previously or developing a new one. In the present study, the first approach was utilized and the concept of *information literacy* was chosen as the central phenomenon as it fit the following criteria: it was "central", it was found "frequently in the data", it was "logical and consistent with the data" that means that there was "no forcing", it was "sufficiently abstract" to be used in other studies for "the development of a more general theory", and it became stronger when the other categories were related to it (Corbin & Strauss, 2008, p. 445 citing Strauss, 1987; Creswell, 2008, p. 444).

Conclusions, that is, the theory grounded in the data, can be developed and formulated in various ways; in the present study it was presented in the form of claims or propositions, that is, "statements indicating the relationship among categories" (Creswell, 2008, p. 446). From the reduced and displayed data and based on a comparison, or triangulation, of the findings from the various sources and instruments, conclusions were drawn, in the form of claims and sub-claims for each of the four research questions. Chapter 4 provides a detailed description of claims and sub-claims validated by evidence from the data. The analytical process concluded with an interpretation of the findings with regard to their context, that is, at the micro level, Malotha School, its library, information technology and information literacy at the school, and at a more macro level, the information age, and with regard to the literature (Chapter 5).

3.7 Limitations and Trustworthiness of the Study

The fact that the study employed a single-case design could be regarded as a limitation, but the concentration on educators' information literacy teaching in one particular faculty permitted the study of the multiple faces and the complexity of the phenomenon in a more intense way (Stake, 1995, p. xi), so that a greater depth and richness was achieved (Simons, 2009). The disadvantage that the developed claims could not be tested, as it would have been possible with a multiple-case design, was compensated by thick descriptions of the context, which allow readers to judge about the transferability of findings to other settings.

Another objection could be that the study did not rely on formal observations as a data collection technique. Finding teachers who will provide access to their natural professional settings, for example, their classroom and the library, while working with students over a longer period of time, is extremely difficult. It would not have been possible at the school that participated in the present study. Also, as explained above, the aim of the present research was not studying the participating faculty as such but doing an instrumental case study, or in other words, using this faculty to get an insight into the research questions (Stake, 1995), so that other techniques were just as appropriate or even more appropriate than observations. Questionnaires and interviews helped to find out things that could not be observed (Patton, 2002), for example, events and behaviors that happened in the past (Merriam, 2009; Patton 2002) and over a longer period of time. In order to enhance the trustworthiness of findings, not only techniques but also sources were triangulated (Pickard, 2007).

The widespread "hierarchical view" on research methodologies and methods (Yin, 2009, p. 6) sees quantitative methods on the top end, beginning with experiments, and qualitative methods at the lower end. Disagreeing with this conception, Yin emphasizes that the quality of a research method does not depend on its place in a hierarchy and suggests, just as Creswell (2008), to consider qualitative and quantitative approaches as complementary. A major concern about qualitative research, including case study research, is that it lacks rigor (Yin, 2009). In order to enhance the trustworthiness of the present study, that is, the "somewhat overlapping issues" of confirmability, dependability, credibility, and transferability (Miles & Huberman, 1994, p. 277), several strategies were employed. Most of them have already been described on the previous pages in the relevant subsections; Table 3-13 provides an overview and displays for each of the four dimensions of trustworthiness the

aspect that it addresses, the term used in quantitative research, the term and definition in qualitative investigations, and the measures employed in this study.

Table 3-13: Trustworthiness of the Study

Aspect	Term in quantitative research	Term in qualitative research	Definition in qualitative research	Measures used in this study
Neutrality	Researcher objectivity	Data Confirmability	Findings being investigator-proof Another investigator would have come to the same findings	– Detailed audit trail (= this report) – Triangulating sources and techniques; comparing internal and external perspective – Alternating between shorter onsite and longer offsite periods during data collection – Developing matrices for combining conclusions and data – Developing clear rules for transcriptions, anonymization, and data entry in matrices – Taking into account competing conclusions – (Investigator) Identifying and monitoring (her) worldview and potential biases – Maintaining a case study data base
Consistency	Reliability	Dependability/ Auditability	Stability (over time, across investigators): Procedures of study could be repeated with same findings Trackable (explainable) variance	– Choosing a research design that is congruent with research questions – Being explicit about theoretical assumptions – Using maximum variation as a major sampling strategy – Triangulating sources and techniques; comparing internal and external perspective – Testing and refining instruments in pilot study – Using written interview guides and same script during each interview – Interview transcripts: high-quality recordings, clear transcription rules, and thoroughly double-checking transcripts – Seeking critical feedback on procedures in presentations at doctoral colloquia – Detailed audit trail (= this report)
Truth value	Internal validity	Credibility/ Authenticity	Findings matching the multiple realities in participants' minds Findings being credible to participants and readers	– Rich descriptions of context – Comprehensive report – Triangulating sources and techniques; comparing internal and external perspective – Supporting claims and sub-claims with evidence from the data (numbers, quotes, paraphrases) – Developing matrices for combining conclusions and data – Deliberate search for rival explanations and negative evidence – Doing member checks for interview transcripts and tracing changes
Applicability	External validity	Transferability/ Fittingness	Developing claims that can be transferred to another setting depending on the degree of "fit" between the two settings	– Using purposeful sampling and especially maximum variation – Detailed description of context and participants – Rich descriptions of findings – Making suggestions for transfer of findings to other settings in general and to settings in Germany in particular – Making suggestions for future research

Data confirmability

For addressing the aspect of neutrality in qualitative studies, Guba (1981) recommends "shift[ing] … away from the concept of investigator objectivity [used in quantitative studies] toward the concept of data (and interpretational) confirmability"; the aim is to "produce findings that are ... investigator-proof" (p. 86). In order to ensure the confirmability of the present study, triangulation of sources was used (Guba, 1981) with the collection of data not only *from* teachers themselves but also *about* teachers from administrators and students combined with triangulation of techniques, according to which data were gathered from teachers in questionnaires and interviews. During data collection, the alternation between shorter onsite and longer offsite periods helped to minimize the risk of bias related to "the effects of the case on the researcher" (Miles & Huberman, 1994, pp. 265-266). A large number of matrices (Appendices 19 and 20) were used in order to combine conclusions with reduced data (Miles & Huberman, 1994) and competing conclusions were taken into account (Miles & Huberman, 1994; Yin, 2009). Other important strategies were the development and use of clear rules for transcriptions (Appendices 13 and 14), anonymization (Appendix 15), and data entry in matrices (Appendix 18). This report is meant to be the "audit trail" requested by several authors, that is, a detailed description and explanation of the research methods, strategies, and procedures used, and of the decisions taken in order to provide an encompassing picture of the study (Guba, 1981, p. 83; Miles & Huberman, 1994, p. 278). All collected data were stored in a "case study database" (Yin, 2009, pp. 118-119) (Index in Appendix 22), so that in theory other investigators could reanalyze them (Miles & Huberman, 1994). Throughout the whole process, the investigator identified and monitored her underlying worldview, values, assumptions, possible biases, and her professional background (Guba, 1981; Miles & Huberman, 1994), so that she was able to adopt a neutral stance and did "not set out to prove a particular perspective or manipulate the data to arrive at predisposed truths" (Patton, 2002, p. 51).

Dependability, Auditability

The aim of the study was to "produce findings that are ... inconsistency-proof" (Guba, 1981, p. 82), or in other words, "*consistent with the data collected*" (emphasis in original) (Merriam, 2009, p. 221). Yin (2009) explains consistency or reliability in the following way: "the operations of a study - such as the data collection procedures - can be repeated, with the same results" (p. 40); and Guba (1981) specifies that "the findings … would be *consistently*

repeated if the inquiry were replicated with the same (or similar) subjects (respondents) in the same (or similar) context" (emphasis in original) (p. 80). Consistency refers to stability over time as well as stability across investigators (Miles & Huberman, 1994, p. 278). In addition, Guba (1981) points out, that consistency does not mean "invariance (except by chance) but trackable variance …, [that means] explainable changes in instrumentation" (p. 81). In qualitative studies, the investigator is the main research instrument; therefore, "change [occurs] not only because of 'error' … but because of evolving insights and sensitivities", hence a certain, "instability is 'real'" and needs to be taken into account (p. 81). The dependability of the present study was enhanced through a design that was consistent with research questions (Miles & Huberman, 1994), the testing and refinement of instruments in a pilot study, triangulation of data collection techniques and sources (Miles & Huberman, 1994; Pickard, 2007), the use of written interview guides and the same scripts during each interview (Appendices 4 to 6), as far as interview transcripts are concerned, high-quality recordings, clear transcription rules (Appendix 14), which were forwarded to the transcription service (Kvale & Brinkmann, 2009), and the investigator thoroughly double-checking transcripts (Merriam, 2009). Other strategies were reporting theoretical assumptions (Miles & Huberman, 1994), using maximum variation as a major strategy of purposeful sampling (Miles & Huberman, 1994), presentations at doctoral colloquia in order to get critical feedback on methods, procedures, strategies used, and decisions (Merriam, 2009), and providing a detailed audit trail (Guba, 1981; Miles & Huberman, 1994).

Credibility, Authenticity

Internal validity is the term used in quantitative research for referring to the truth value of a study (Guba, 1981), that is, for addressing the question "how research findings match reality" (Merriam, 2009, p. 213). Guba (1981), however, explains that in qualitative studies the question is not about matching reality but matching with "respondents' conceptions", that is, the "multiple realities existing in the minds of people" (p. 80). Therefore, the findings should be "credible to the people we study and to our readers" (Miles & Huberman, 1994, p. 278). The credibility of this case study was enhanced by contextualizing concepts and process (Corbin & Strauss, 2008, p. 306), through encompassing descriptions of the context (Miles & Huberman, 1994), triangulation of sources and techniques (Guba, 1981; Miles & Huberman, 1994), the development of matrices for combining conclusions with data (Appendices 19 and 20), supporting claims and sub-claims with evidence from the data (numbers, quotes, paraphrases), the deliberate search for rival explanations (Miles & Huberman, 1994; Yin,

2009), as well as member checks for interview transcripts (Appendix 12) and tracing changes (Guba, 1981; Miles & Huberman, 1994; Yin, 2009).

Transferability, Fittingness

As far as the applicability of a study is concerned, Yin (2009) states that "case studies, like experiments, are generalizable to theoretical propositions and not to populations or universes" (p. 15). Guba (1981, p. 81) explains the difference between the concept used in quantitative research, that is, external validity, and transferability, the more appropriate term for qualitative research, as follows:

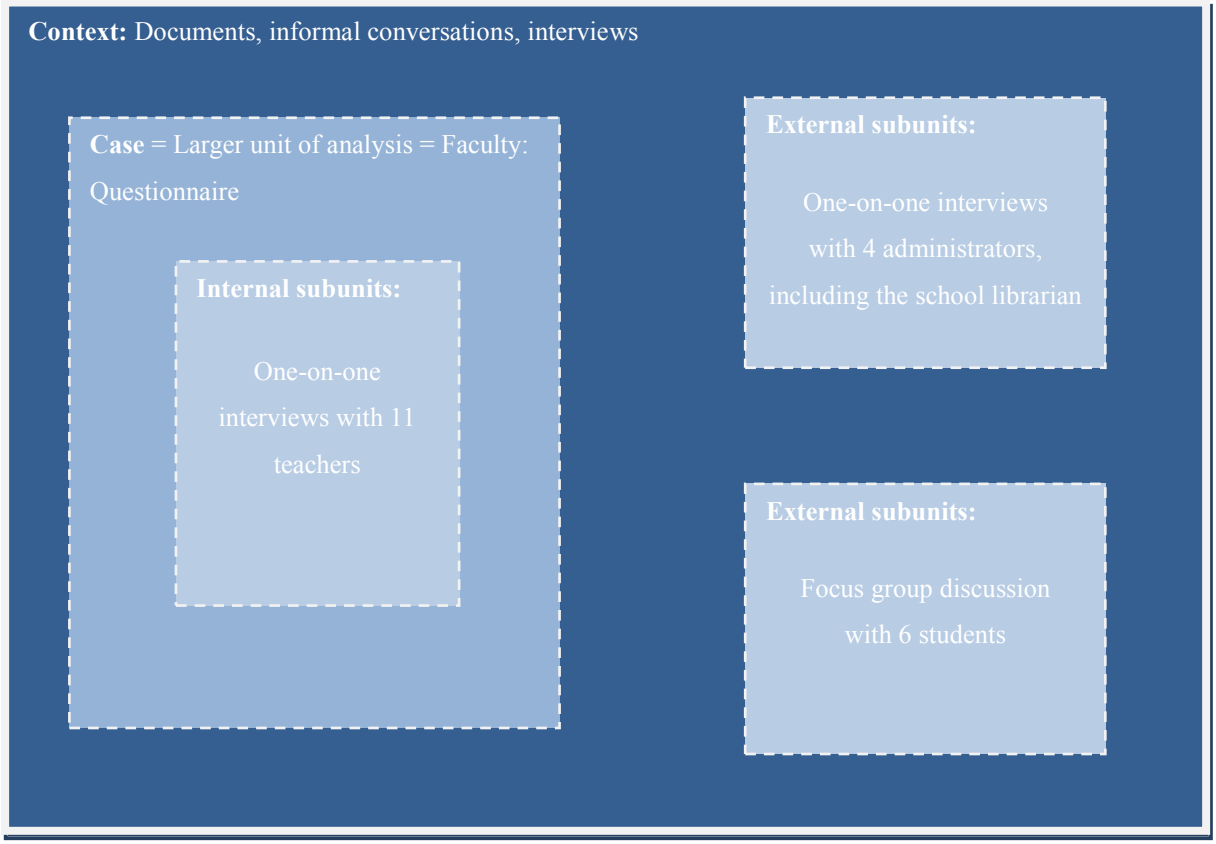
> The naturalist does not attempt to form generalizations that will hold in all times and in all places, but to form working hypotheses that may be transferred from one context to another depending upon the degree of 'fit' between the contexts. (p. 81)

The transferability of findings was ensured through the use of purposive sampling in order "to maximize the range of information uncovered" (Guba, 1981, p. 86), detailed reports about study participants and the context (Miles & Huberman, 1994), the development of "thick descriptions" (Miles & Huberman, 1994, p. 279; Guba, 1981, p. 81; Merriam, 2009, p. 227), by discussing transferability of findings to other settings in general and to settings in Germany in particular, and making suggestions for further testing of findings (Miles & Huberman, 1994).

3.8 Chapter Summary

This chapter began with a description of the interpretivist paradigm on which this study is based, of the major characteristics of the qualitative methodology related to it, and the rationale for exploring educators' information literacy teaching practices with an instrumental single-case study. It explained how the case, that is, teacher faculty at Malotha High School, was purposefully selected, and described the context of the case in terms of the school, the school library, information technology and information literacy at Malotha, and the information age. The next subsection provided rationales for using semi-structured questionnaires and interviews, the latter in the form of one-on-one interviews and a focus group discussion, as the major data collection techniques, described shared and particular features of instruments, and the characteristics of the samples. Before findings are reported in detail in the next chapter, Figure 3-6 gives an overview of data collection at Malotha.

Figure 3-6: Data Collection at Malotha School



Note. Adapted from Yin, 2009, p. 46.

This single case study used an embedded design, which encompassed a larger unit of analysis, that is, the actual case or the faculty, and subunits, that is, individual participants (Yin, 2009). The questionnaire collected data from teachers themselves on the level of the larger unit. It led to a broad understanding of faculty's information literacy teaching. Interviews, which helped to gain a deep understanding of educators' information literacy teaching, collected data from the subunit level, first, from administrators (including the head school librarian) and students about teachers, and afterwards from teachers themselves. During the analysis, findings from teacher interviews and questionnaires were compared or triangulated so that an internal perspective, that is, internal to the case, could be identified. It was compared with the external perspective, that is, external to the case, developed from findings in interviews with administrators (including the head school librarian) and in the focus group discussion with students. Both administrators and students were part of the context, which was explored through documents and informal conversations in addition to interviews.

The major purpose of the pilot study was to develop and test procedures and strategies of data collection and analysis, so that the lessons learned for the final study at Malotha were reported here. For data analysis at Malotha, consistent with the interpretivist paradigm and the qualitative methodology, an inductive approach was chosen. First, the strategies for early analysis were described followed by those for data reduction, display, and conclusion drawing, which all heavily relied on the systematic analytical procedures for developing a theory of the case suggested by Corbin and Strauss (2008). Open and axial coding helped to reduce the data, which began, based on findings from the pilot study, with a provisional list derived from the research questions, questions in instruments, and from the literature, especially Bruce's (1997) information literacy model. The list was used as a sensitizing frame, so that concepts and categories evolved and changed throughout the process. The following thinking techniques from grounded theory enhanced the analysis: making constant and theoretical comparisons, considering the different meanings of a word, looking for metaphors, and asking questions about the data and considering the possible answers. Other data reducing techniques were counting and writing summaries. The major tools for data display were conceptually ordered matrices and role-ordered matrices; the latter helped to triangulate the data. Conclusion drawing began with the identification of a core category to which all other categories are related, and the theory was expressed through claims and sub-claims, validated with evidence form the data. The chapter concluded with a description of the limitations of the study and the strategies used to enhance the trustworthiness of findings, that is, their confirmability, dependability, credibility, and transferability (Miles & Huberman, 1994). In the next chapter a detailed description of findings is provided.

4. Findings

4.1 Chapter Overview

In order to gain a deep understanding of the process of information literacy teaching in a faculty, the following research questions were addressed using a grounded case study approach:

1. What are teachers' conceptions of student information literacy learning and learners?
2. What information literacy competencies, if any, are encompassed in the research tasks that teachers assign?
3. Which pedagogical interventions, if any, do teachers use when they teach information literacy?
4. How do teachers work with the school library and school librarians, if at all, when they teach information literacy?

These research questions were answered based on a rigorous inductive analysis of semi-structured one-on-one interviews with four administrators (including the head school librarian), a semi-structured focus group discussion with six students, questionnaires with mainly open-ended questions completed by 26 teachers, and semi-structured one-on-one interviews with 11 teachers. Data from administrators and students formed the external perspective and those from teachers formed the internal perspective. While the previous chapter described and discussed the methods of data collection and analysis, this chapter provides encompassing descriptions of the findings for each research question. For each, statements of claims and sub-claims are presented, supported by summarizing matrices, detailed narratives of the evidence, and a selection of exemplary quotes. The subsection for each research question ends with some summarizing statements. Data were not available for all sub-claims from all groups of participants, but wherever there were data from more than one source or technique, the findings are triangulated. As mentioned above, although all study groups were composed of both men and women, in this report exclusively masculine pronouns are used for referring to participants in order to protect their anonymity within Malotha School.

During the analytical process, the broad category *information literacy* was identified as the central or core category (Corbin & Strauss, 2008, p. 104). Based on the data and enhanced by the literature (Chapter 2) and especially Bruce's (1997) information literacy model, the following seven information literacy categories emerged out of the data during the analysis: completion of a process, use of information technology, finding of information, information control, knowledge building, ethical use of information, and presentation of information (Appendix 17 provides a more detailed description). They were used for exploring and describing teachers' conceptions of student information literacy learning (section 4.2) and their (inter)actions in the process of information literacy teaching (sections 4.3, 4.4, and 4.5). The chapter finishes with an overview of key findings.

4.2 Teachers' Conceptions of IL Learning and IL Learners

As outlined in the literature report in chapter 2, numerous authors have argued that teachers' practices of (information literacy) teaching are influenced by their conceptions of (information literacy) learning (Bruce, Edwards, & Lupton, 2006, p. 1; Hallet, 2009, p. 3; Kuhlthau, Maniotes, & Caspari, 2007, p. 13). The literature review also showed that research about teachers and information literacy is scarce (sections 1.1 and 2.3.5) so that an emergent design was chosen and teachers' conceptions of information literacy learning (Research Question 1) were investigated through rather broad questions that allowed participants to choose the direction of their answer. Based on the analysis of the data from administrators (external perspective), the following overarching claim was developed:

Claim 1: Teachers do think about student information literacy learning.

There is ample evidence from administrators (external perspective) to support this claim. When they were asked in interviews what classroom teachers think about student learning of information location, evaluation, and use (Interview Guides in Appendix 4), administrators stated that teachers do think about it. Administrator A explained that teachers' preoccupation is to find the best ways to teach subject content and within this context, they may consider student learning of information literacy (Administrator A, par. 14). He added, "It becomes one of a great many things that teachers are asked to think about" (Administrator A, par. 13). He felt able to say that teachers do think about information literacy from "having interacted with other teachers for years and years and years over lunch table, in department meetings, all those places where you connect with other teachers, you do hear teachers talking"

(Administrator A, par. 37). However, both Administrator A and Administrator B emphasized that within their faculty there is variety. When Administrator A said that Malotha teachers think about teaching information literacy, he added that "some [do it] more consciously than others" (Administrator A, par. 14). Administrator B noted that "some classroom teachers realize it's their responsibility to participate in that, the education of students about the information age. And some classroom teachers think that their responsibility is to teach only the particular content" (Administrator B, par. 14). He described it as "sort of a bell curve kind of range" (Administrator B, par. 26) with "between 5 and 25 percent" of teachers perceiving the teaching of subject content as their only responsibility, "probably 25 to 35 percent" considering information literacy teaching in the context of their subject as being part of their job (Administrator B, par. 26), and the majority, "45 percent or so", being somewhere in the middle (Administrator B, par. 28).

Based on the analysis of the data collected from teachers (internal perspective) the following two sub-claims were developed:

- Sub-claim 1a: Teachers think that an information literate student is able to evaluate and to analyze information, to find it in a variety of sources, and to make use of information technology for information location.

- Sub-claim 1b: Teachers think that their students have problems when they undertake research tasks predominantly with analysis and ethical use of information.

Data were not available for both sub-claims from teacher questionnaires and interviews. For sub-claim 1a about teachers' conceptions of an information literate student, evidence was used from questionnaires only. Evidence for sub-claim 1b about educators' conceptions of student difficulties in research tasks was only available in interviews. Evidence from questionnaires is presented first.

4.2.1 Teachers' Conceptions of an Information Literate Student

Sub-claim 1a: Teachers think that an information literate student is able to evaluate and to analyze information, to find it in a variety of sources, and to make use of information technology for information location.

For this sub-claim, evidence is only available from questionnaires, where teachers were asked in three separate questions to provide their picture of a student who is an effective locator of

information, an effective evaluator of information, and an effective user of information (questions 3 to 5 in Appendix 10). In their descriptions, teachers mentioned concepts and competencies related to the execution of a process, the use of information technology, finding of information, information control, knowledge building, the ethical use of information, and information presentation (Table 4-1). It should be noted that the fact that individual teachers did not mention particular information literacy concepts and competencies is not necessarily an indication that they did not perceive them as important for an information literate student to develop; they might have simply forgot about them at the time of questionnaire completion.

Completion of a research task as a process composed of a number of steps

Only one teacher mentioned the information process: Teacher 22 wrote that an effective information locator is "excited about the process (not end result i.e. test)" (QT22, par. 3).

Use of information technology (IT)

Half of participants (13/26) noted that an information literate student is one who can use information technology in order to locate information. For example, Teacher 3 stated that such a student "owns a smart phone and uses it as first choice for getting needed info" (QT3, par. 3).

Finding of information in different formats

When they described the concepts and competencies of information finding that an information literate student has developed, 15 teachers referred to the *variety* of formats. For such a student, they wrote, for example, that he knows "all the possible ways one can access information or ideas" (QT2, par. 3), "how to do a variety of searches in a variety of settings" (QT9, par. 3), and "how to use all the resources available to him/her" (QT16, par. 3). The ability to find information in at least one specific type of source was mentioned by 16 teachers. By far the most mentioned format was *web sources* (12/26 teachers); for example, Teacher 1 wrote that a good information locater "is internet comfortable" (QT1, par. 3) and Teacher 3 noted that such a student uses web sources "as first choice" (QT3, par. 3). The next most mentioned formats were *databases* and *human sources*, each time 5/26 teachers described them as sources that an information literate student is able to use, then *popular periodical sources*, mentioned by 4/26 teachers, and finally *books*, and course manuals (*textbooks*), both types were mentioned by 3/26 participants. Out of the 26 teachers, only two

teachers cited the overarching term *school library sources*, one cited *visual sources,* and two mentioned *other types of sources*.

Table 4-1: Teachers' Conceptions of an Information Literate Student

IL categories / **Role**	**Process**	**IT use**	**Information finding**	**Information control**	**Knowledge building**	**Ethical use**	**Information presentation**
Teachers *(Questionnaires)*	1/26	13/26	Variety: 15/26 Web: 12/26 Databases: 5/26 Human: 5/26 Popular: 4/26 Books: 3/26 Textbooks: 3/26 Library: 2/26 Visual: 1/26 Others: 2/26	2/26	Evaluation: 16/26 Analysis: 15/26 Engage-ment: 5/26 Extraction: 2/26	3/26	7/26

Control of information

Control was another category of information literacy that was not mentioned much, with only two teachers referring to it. Teacher 14 wrote that information literate is "a student who understands file management and directory structure on a computer" (QT14, par. 3) and Teacher 19 wrote that such a student is "organized" (QT19, par. 5).

Use of located information in order to build new knowledge

Within the category of knowledge building, 16/26 teachers noted that an information literate student is a good *evaluator* of information. They wrote, for example, that he cross checks multiple sources (QT2, par. 4; QT3, par. 4, QT13, par. 4), "can distinguish between authoritative sources and less reliable sources" (QT10, par.3), "knows which types of sites are valid or not" (QT12, par. 4), is "able to discern scholarly work from pop-culture i.e. wikip." (QT25, par. 4), and that he "determines relevance of information" (QT17, par. 5). Almost the same number of questionnaire participants, 15/26, referred to the ability to *analyze* information. Two of them wrote that information literate students are able to develop a focus at the beginning of the research process (QT5, par. 3; QT17, par. 3). Two others emphasized that such students are "well-read" (QT8, par. 4: QT19, par. 4) and possess an important amount of prior knowledge. Teacher 23 referred to the ability to extend knowledge when he wrote that students who are good information users "can take their information and effectively apply it to their previous knowledge and use it to make their own connections and expand their thinking" (QT23, par. 5). Five out of the 26 teachers mentioned the ability to *engage* with information in the form of reading. They wrote about an information literate student, for example, that he is a "high level reader" (QT5, par. 4), and "one who carefully reads the text; reads other given sources" (QT18, par. 3). Only 2/26 teachers referred to information *extraction*, writing that the information competent "student will highlight important passages on a text" (QT4, par. 3) and "takes effective notes" (QT17, par. 5).

Ethical use of information

Only 3/26 teachers referred to aspects related to the ethical use of information. They noted that an information literate student is "honest" (QT20, par. 3), "properly cites sources" (QT14, par. 5), and "takes effective notes with references and page numer" [*sic*] (QT17, par. 5).

Presentation of information, predominantly in written format

The ability to present information as a characteristic of good information users was mentioned by 7/26 teachers. While three out of the seven mentioned written format, only one mentioned oral format; moreover, two noted that good presenters are articulate, and one referred to the competency of structuring information.

Taking all seven information literacy categories together, the competencies of an information literate student that questionnaire participants mentioned most often were evaluation of information (16/26 teachers), analysis of information as well as the ability to find a variety of sources (both were mentioned by 15/26 teachers), and then using information technology in order to locate information (13/26 teachers). The ability to present information was cited by 7/26 teachers. The least often mentioned competencies were ethical use of information (3/26 teachers), control of information (2/26 teachers), and completion of a process (1/26 teacher).

4.2.2 Teachers' Conceptions of Student Difficulties

Sub-claim 1b: Teachers think that their students have problems when they undertake research tasks in the first place with analysis and ethical use of information

In interviews, teachers talked about students' difficulties with concepts and competencies of information literacy. As Table 4-2 shows, teachers identified difficulties with information finding, control, knowledge building, ethical use, and presentation of information but not use of information technology and execution of the research process.

Table 4-2: Teachers' Conceptions of Student Difficulties in Research Tasks

IL categories / **Role**	**Process**	**IT use**	**Information finding**	**Information control**	**Knowledge building**	**Ethical use**	**Information presentation**
Teacher *(Interviews)*	0/11	0/11 (Ease: 2)	8/11 (Ease: 4)	1/11	Evaluation: 7/11 (Ease: 2/11) Engage-ment: 3/11 Extraction: 1/11 Analysis: 4/11	4/11	2/11

Students' difficulties with the use of information technology

Teachers did not talk about any problems students had with information technology, but rather two of them reported about students' ease with information technology. Teacher B claimed that all Malotha students are able to use PowerPoint in BRP9 because they learned it in grade 7 (Teacher B, par. 140). Teacher G described information literate students as having a high level of technological literacy:

> The ones that are good are so good that I don't know what they're doing. They just seem to not even have to read the screen. Their hands almost seem to fly and they just- Their maneuvers, it's like they're driving through a race course and they just seem to have the senses they need to make the right turn. (Teacher G, par. 40)

Students' difficulties with information finding

Eight out of the eleven teachers who participated in interviews reported on problems their students had with the location of information in research tasks. For example, talking about an extended project he had assigned, Teacher F stated that students have difficulties with utilizing search engines by either using search terms that are too broad or none at all, for instance, "like typing in the question" (Teacher F, par. 31). Teacher H noted that "sometimes" students did not know what to search (Teacher H, par. 50). Teacher B reported about a small research project in which the most difficult part for students was the formulation of good interview questions, that is "forming a decent question, forming a question that wasn't so generic and shallow" (Teacher B, par. 20). Four out of the eleven teachers claimed that students are good at finding information, especially on the web. For example, Teacher E said: "But what I am finding, at least here, the students are very, very knowledgeable in the internet and where to get information there. So like they'll do their Googling or whatever, they just go for it." (Teacher E, par. 12). Teacher J not only claimed that students are able to locate online information but also that they can do it at a higher speed than their teachers: "They can get the information, they know how. ... They know how. I mean, they can just go online and they can find anything. ... They can find the answers so much faster than we could." (Teacher J, par. 54-56).

Students' difficulties with information control

Only one teacher reported about students who had problems with information control. Teacher I noted that those students who get behind in BRP11 are the ones who are unorganized and

explained that keeping all the materials in a folder and organizing them within that folder is one of the distinguishing features of students who do well in the whole project. It is not a matter of intelligence. He said:

> I swear, that's the key to it, is just being organized. The kids that do best on this are kids that ... come with their folder, and they just stay organized. ... That's it. ... They're organized. They open up their folder, they have all their peer-reviewed on one side, they have all the general press on the other, their articles. ... They organize that they meet the timelines ... they're usually two steps ahead. Like right now, there should be eight peer-reviewed sources summarized, the unorganized kids probably have five done, really organized kids, not the most intelligent but the most organized, have eight done right now. You can just see the packs started to separate as far as those kids that are getting organized and getting along with the process and those that are going to lie behind. (Teacher I, par. 98 – 102)

Students' difficulties with knowledge building

In the category of knowledge building, teachers talked about problems students have with information evaluation, engagement, extraction, and analysis. Seven educators reported about students' difficulties with *evaluating* information, especially online, whereas two reported about good evaluators. With regard to difficulties, Teacher H claimed that students are easily "persuaded" by free online encyclopedias and that it is difficult for them to evaluate them for legitimacy (Teacher H, par. 46). Also talking about online information, Teacher J explained: "It's whether or not it's good information, relevant information, accurate information, objective, unbiased, up-to-date, current, that kind of part of the finding of the information, I think, is where they are lacking" (Teacher J, par. 56). Teacher K stated that students are reluctant to make the effort needed to present credible information. He stated:

> We want our students to be able to say, with credibility of their own. ... How do they earn it is through responsible research and information, which at the end they realize is incredibly time consuming and they don't want to do that. (Teacher K, par. 21)

In his description of students whom he qualified as excellent evaluators, Teacher B explained that they are able to evaluate online information for credibility, going further than just the first result in a list (Teacher B, par. 100). They would use information from free online encyclopedias, but they would use it knowing its strengths and weaknesses (Teacher B, par. 102), whereas "other kids" would use it as the only source (Teacher B, par. 104). Teacher G was the only teacher who thought that, in general terms, students' ability to evaluate online information is improving and that they appreciate the use of high-quality websites. He noted:

> I think the kids are becoming more and more savvy on what's a good site and what isn't. And I think they're very impressed when they can use college websites and materials that are coming from very valid and very impressive sources and not just a book in a library. (Teacher G, par. 36)

Four teachers talked about problems students had with the *analysis* of information in order to develop a personal point of view. For example, Teacher J explained that his students tended to collect facts rather than using the information they located in order to develop new knowledge in his extended project, he noted:

> I think the most difficult part was understanding the research report [being] related to the [analysis]. ... Because I had a lot of students who thought that they were just going to research one topic ... and tell me what they learned and then be done with it. ... They just showed up with, 'Here is two pages of [topic XY].' And I said, 'That's not what you're supposed to do at all.' So I think that was a little difficult for them. And I think that may have come back to this idea of research as being 'find the information, then give me the information', not 'find the information and then do something with it'. (Teacher J, par. 62)

Teacher H also claimed that moving deep into a topic, comparing different perspectives, and taking their time to stay back and think in order to develop their own point of view was challenging for students:

> And so, I think, that the most difficult part was telling them that they really needed to stay with it and to find more information, more opinions, give a little bit more of direction and really compare things. And to take their time, I don't think our students take their time with much of what they do, in any aspect of their education, extracurriculars. They very much want results right away. And I really think that that's just the way our generation is, the generation is right now of kids. And I don't think that's going to change just because there's instant gratification and so many things now. And so, to take their time to evaluate into research, and to really think about what the essential questions might be was really the challenge in it. (Teacher H, par. 48)

Three teachers said that students have problems when they *engage* with information. Teacher C (Teacher C, par. 17) and Teacher I (Teacher I, par. 78) explained that reading the required type of information in BRP11 was particularly challenging for students because of the high academic level of the texts. Teacher C saw major differences between students and explained them with their limitations in vocabulary and knowledge (par. 19), effort (par. 81), intelligence (par. 38), and the ability to "understand things better, at a higher level" (par. 81). Teacher J reported that students have difficulties transferring their reading skills from one course to another, stating that students "just don't know how to take their skills of reading a primary source document in history and transfer it and shift it into a [language] classroom setting" (Teacher J, par. 60).

Only one interview participant, Teacher I, talked about problems his students had with information *extraction*. He stated that given the high-academic level of the texts, both reading and summarizing were extremely difficult for students (Teacher I, par. 78).

Students' difficulties with the ethical use of information

Four teachers talked about students' problems with the ethical use of information. For example, Teacher H claimed that students take the information they read for granted and then consider and use it as their own opinion, without mentioning the source: "I think, in today's world, they read something once and then that's there opinion, and really blindly they do it without sourcing the information" (Teacher H, par. 48). When he talked about BRP10, Teacher K claimed that "the typical tenth grader tends to" neglect documenting his sources (Teacher K, par. 46). Reasons he mentioned were the easy availability of online information: "They live in the world of the web. For them it's a non-issue, everybody owns it. We press a button, there it is." (Teacher K, par. 44), the fact that students do not personally know authors (Teacher K, par. 47), and finally laziness or carelessness: "It comes down to a couple of things, they are either too lazy, which is bad, or they do not care, which is worse" (Teacher K, par. 70). Other reasons he mentioned were that students did not realize that they had a knowledge gap or that they learned something from a source (Teacher K, par. 45-46), distraction, and especially "dismissiveness" (Teacher K, par. 64).

Students' difficulties with presenting information

Two teachers addressed students' problems with the presentation of information. Both reported about students having difficulties with the revision process. Teacher I noted: "Then they get the rough draft back, and it's marked up in red and there is a bout of depression there" (Teacher I, par. 88). Teacher J noted: "And I think that they don't like the revision process, I think that that's something that is frustrating to them. They want to write it and be done with it on some level" (Teacher J, par. 66).

Taking all seven information literacy categories together, it is difficult to establish where teachers think students have the most problems. For the two that were reported most often, evidence is contradictory: while 8/11 teachers noted that information finding can be difficult for students, 4/11 said that it's easy for them; and whereas 7/11 teachers found that students have difficulties with evaluation of information, 2/11 reported that students were good at it. In addition, each time 4/11 teachers claimed that students encounter problems with information

analysis and the ethical use of information. Only 2/11 teachers saw difficulties with information presentation in their classes and one teacher reported about students' difficulties with information control. Teachers did not talk about students' difficulties executing the research project as a process and with the use of information technology. For the latter, instead, 2/11 teachers reported about students being good at it.

4.2.3 Summary for Teachers' Conceptions

The following summarizing statements, although free of numbers, were closely derived from the data. The majority of teachers do think about information literacy learning; the majority of administrators brought the claim forward and ample evidence was found in teacher questionnaires and interviews.

Analysis of questionnaires showed that participating teachers perceived of an information literate student predominantly as one who is able to evaluate information, to analyze information, to use information technology in order to locate information, and to find a variety of sources, among which web sources are of particular importance. Teachers regarded such a student to a lesser extent as being capable of presenting information, and least as having developed the competencies of making ethical use of information, controlling information, and executing a step-by-step process. In brief, participating teachers did not only perceive of an information literate students as one who has developed particular skills, but especially as one who is able to think about the information and to use it for constructing new knowledge.

In interviews, all eleven teachers identified problems that students had with information literacy but their conceptions were partly contradictory. Unanimity existed that students have difficulties with information analysis and the ethical use of information. The statements regarding information location and evaluation were contradictory, as for both each time a majority of teachers said that they are challenging for students and a smaller group reported about students being good at them. Students encountering problems when they present and control information were both reported by a minority of teachers; no teacher talked about problems students have with the research process as such or with the use of information technology. For the latter, a small group of participants explicitly mentioned that students could do it well.

The next three sections report findings for teachers' practices of information literacy teaching.

4.3 IL Competencies in the Research Tasks Teachers Assign

This section presents the findings for the second research question about information literacy competencies comprised in the research tasks that teachers assign. The following claims were derived from the analysis of the data collected in one-on-one interviews with four administrators, including the head school librarian, the focus group discussion with six students (external perspective), as well as questionnaires completed by 26 teachers and one-on-one interviews with 11 teachers (internal perspective):

Claim 2: The majority of teachers teach information literacy and they do so primarily through the assignment of research tasks.

Claim 3: The research tasks that teachers assign encompass a variety of information literacy competencies.

Claim 4: The type of class shapes the decision to teach information literacy.

Claim 5: The scope of the research task and the knowledge domain shape the information literacy competencies encompassed in research tasks.

For each of the claims several sub-claims were identified, which will be presented in the next three subsections.

4.3.1 Teaching IL through Research Tasks

Claim 2: The majority of teachers teach information literacy and they do so primarily through the assignment of research tasks.

This claim about information literacy teaching practices is supported by the following sub-claims:

- Sub-claim 2a: In addition to delivering information to students, the majority of faculty teaches information literacy.
- Sub-claim 2b: The primary mechanism for teaching information literacy is through small-scale and extended research tasks.

4.3.1.1 The majority of faculty teaching IL

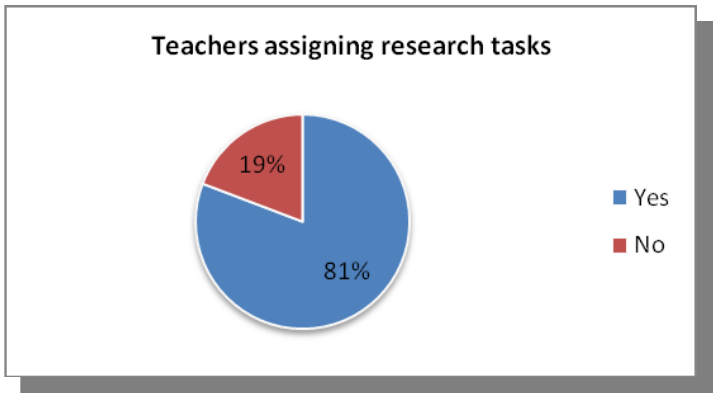
Sub-claim 2a: In addition to delivering information to students, the majority of faculty teaches information literacy.

Transmitting information to classes is an important teaching strategy at Malotha School as reported by administrators and students (external perspective). Administrator A claimed that teacher-centered teaching where teachers present subject content to students still occurs "a lot" at their school (Administrator A, par. 19). Administrator B noted that "between five and 25 percent" of their teachers deliver all subject content on their own (Administrator B, par. 26). Administrator D said that there are "still" teachers at their school who use "that model of what some people call 'the banking method of education', simply make a deposit and then you have the tests and that's the withdrawal" (Administrator D, par. 33). Two students (Student 3, 5) reported about teachers making use of document cameras in order to present information to their classes. Student 3 claimed that "the majority" of his teachers use them "a lot" (Student 3, par. 69). Student 5 confirmed this and added "and if they don't have them they're like, 'Oh, we'll go borrow someone else's'" (Student 5, par. 70). In interviews, teachers (internal perspective) also reported about transmitting information to students. Teacher A stated that the delivery of information is his job: "Teaching information is just what I do every day" (Teacher A, par. 17). Teacher B described how he uses textbooks and presentation software in order to deliver information to his classes (Teacher B, par. 28). Teacher E reported that he provides most of the relevant subject information to his higher performing students, that is, AP or honors classes, and all of it to regular students, specifying: "I give them everything they need to know" (Teacher E, par. 139). Teacher H also reported about a class where he delivers the information (Teacher H, par. 14).

The majority of Malotha educators teach information literacy as reported by administrators and students. Administrator D noted that at their school "most of the teachers" do not simply deliver information but require students to handle information on their own (Administrator D, par. 33). Administrator C claimed that teachers "across the board" teach the location and evaluation of online information (Administrator C, par. 21). And Administrator B emphasized that there is variety, noting: "As many teachers as we have, they have many different ways to teach it" (Administrator B, par. 34). All six students talked about teachers who assign small-scale and/or extended research tasks (for example, Student 1, par. 296; Student 2, par. 281; par. 283; Student 3, par. 285, 289; Student 4, par. 301; Student 5, par. 336-339; Student 6, par.

49). All teachers who participated in interviews (Table 4-3 and Table 4-4) and 21 out of the 26 teachers (81%) who completed a questionnaire (Figure 4-1) reported about teaching information literacy through the assignment of research tasks.

Figure 4-1: Percentage of Teachers Assigning Research Tasks (Questionnaires)



Note. N=26

A comparison of the external perspective, which was gained from administrators and students, with the internal perspective, which was gained from teachers in questionnaires and interviews, indicates that at Malotha School the transmission of information is an important teaching strategy but, in addition, the majority of teachers also teach information literacy.

4.3.1.2 Assigning small-scale and extended research tasks

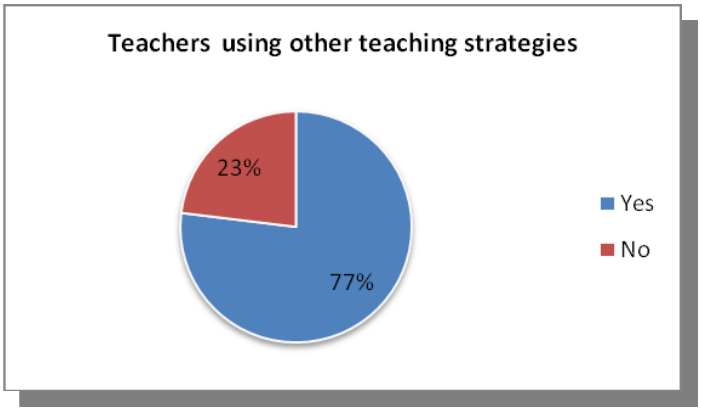
Sub-claim 2b: The primary mechanism for teaching information literacy is through small-scale and extended research tasks.

Study participants identified the assignment of small-scale and extended research tasks as the primary mechanism for information literacy teaching. They described research projects in terms of time needed to complete them and size of end products (see Appendix 19). Based on the descriptions, the following definitions were developed: Extended projects take a month or more to accomplish and result in at least an eight- to ten-page paper, a four-page website or a 30-minute presentation. All other projects were qualified as small-scale.

The majority of those Malotha educators who teach information literacy do it through the assignment of small-scale projects. In questionnaires, 20 out of the 26 teachers (77%) reported about teaching information location, evaluation, and use outside extended projects (Figure 4-2). They listed examples including the following: research tasks in order to develop critical thinking such as comparing varying points of views (QT18, par. 10); developing arguments to

be brought forward in class discussion (QT5, par. 10); thinking critically about (literary) texts (QT1, par. 10; QT2, par. 10; QT7, par. 10, QT17, par. 10; QT19, par. 10); "cooperative learning" (QT14, par. 10; QT24, par. 10) and group projects (QT19, par. 10); (QT12, par. 10); "independent building projects" (QT24, par. 10); lab exercises (QT1, par. 10; QT14, par. 10; QT20, par. 10); "investigating cultural concepts/practice in different countries" (QT16, par. 10); and one teacher noted: "Instead of assigning large research projects, I assign current events that provide students the opportunity to seek out events that are relevant and of interest to them" (QT23, par. 10).

Figure 4-2: Percentage of Teachers Using Other Teaching Strategies (Questionnaires)



Note. N=26

In one of the quantitative questions in the interviews (Question 5 in Appendix 3), all 11 teachers noted that they had already addressed information location, evaluation, and/or use outside of extended research projects (Table 4-3).

Table 4-3: Use of Other Teaching Strategies (Teacher Interviews)

Teacher	**Using other teaching strategies**	
	Yes	**No**
Teacher A	X	
Teacher B	X	
Teacher C	X	
Teacher D	X	
Teacher E	X	
Teacher F	X	
Teacher G	X	
Teacher H	X	
Teacher I	X	
Teacher J	X	
Teacher K	X	
Total	**11**	**0**

All teachers except Teacher C and Teacher I reported in more detail about at least one of these smaller research tasks in the extensive qualitative part.

Although 19% of faculty noted in questionnaires that they had not assigned any type of research task for information literacy teaching (Figure 4-1), it was not possible to interview any member of that group. Those teachers who were said not to do any information literacy teaching at all by the key informant and/or other faculty members who participated in interviews and who thought so themselves, actually turned out during their interviews to address it in some way or other in their classes. Reasons for the impossibility to find any teachers who belong to that particular group may be that while they do teach information literacy in their classes, some of the questionnaire participants did not indicate to do so either because they did not understand the questions or because they decided to complete the questionnaire as quickly as possible. Another reason may be that it was not possible for the investigator to identify and get into contact with these particular faculty members although she repeatedly tried to do so.

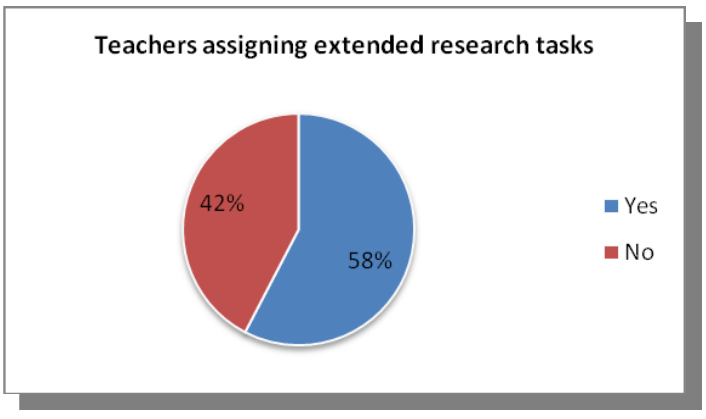
The findings from teachers were supported by findings from external participants. Administrators (4/4) and students (4/6) reported about short or small-scale research tasks. Administrator A explained that the assignment of this type of tasks is done "constantly" (Administrator A, par. 35), for example in history classes (Administrator A, par. 38; 43-45). He also provided the example of a particular history teacher who repeatedly had done a small research project where students had to search and present specific theories (Admin A, par. 85-86). Administrator B claimed that there is variety within their faculty, and that "some teachers teach it by assigning small projects" (Administrator B, par. 34), and he gave several examples: a history teacher who had students search and present theorists (Administrator B, par. 40), a language teacher who did "a short research project" about "ancient Greece and Rome" (Administrator B, par. 50), another language teacher who prepared a class trip (Administrator B, par. 62), and a math and science teacher who asked students to locate graphical information (Administrator B, par. 65). Administrator C reported that teachers address competencies of information literacy with regard to online sources in their daily teaching (Administrator C, par. 21). Administrator D gave the example of history teachers who address competencies of information literacy in their everyday teaching (Administrator D, par. 44). Four students (Student 1, 2, 4, 6) reported about small projects (Student 1, par. 296; Student 2, par. 281; par. 283; Student 6, par. 49), for example, short essays (Student 4, par. 296).

At Malotha, educators also teach information literacy through extended projects. Administrators unanimously identified the three scheduled research programs in grades 9, 10, and 11 as major opportunities for information literacy teaching. For example, Administrator A stated:

> We have some programs ... that explicitly connect to that particular question: The ninth grade [name of program] does that and, again, talking about just the high school division, the upper division, then the research project, well research projects I'll say, with sophomores in [a language course] in the humanities and then in the junior year with the science research project there is some very explicit instruction about information location, evaluation, and use. (Administrator A, par. 36)

The three scheduled big research projects will be referred to hereafter as follows: the one in freshman year will be abbreviated as *BRP9*, the one in sophomore year as *BRP10* and the one in junior year as *BRP11*. All six students, who had spent grades 9-12 at Malotha, had participated in all three of them. In questionnaires, 15 teachers out of the 26 (58%) reported about assigning extended research projects to students (Figure 4-3). The examples they provided included two of the school's three scheduled programs, the extended projects BRP10 (QT2, par. 7; QT4, par. 7) and BRP11 (QT5; par. 7; QT18, par. 7; QT19, par. 7), as well as independent studies (QT20, par. 7; QT26, par. 7), "creative projects" (QT17, par. 7), using research in order to plan, run, and evaluate experiments (QT1, par. 7-8), extensive web quests or research papers about literary writers, periods, and/or works (QT7, par. 7; QT25, par. 7), "projects where students must seek out a variety of primary, secondary, audio and visual resources over deep topics" (QT9, par. 7) and high school students teaching younger students (QT21, par. 13).

Figure 4-3: Percentage of Teachers Assigning Extended Research Tasks (Questionnaires)



Note. N=26

Fourteen out of the 21 teachers who had assigned research tasks reported about assigning both types of research tasks in questionnaires, six (QT3, QT6, QT12, QT15, QT16, QT23) about assigning small-scale projects only and one teacher (QT25) about assigning extended projects only.

Table 4-4: Involvement in Extended Projects (Teacher Interviews)

BRP / Teacher	BRP9		BRP10		BRP11		None of these		Other BRP	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**NA**	**Yes**	**No**
Teacher A	X		X			X		X		X
Teacher B	X			X	X			X	X	
Teacher C		X		X	X			X		X
Teacher D		X		X		X	X			X
Teacher E		X		X		X	X			X
Teacher F		X		X	X			X		X
Teacher G		X		X		X	X			X
Teacher H		X		X		X	X		X	
Teacher I		X		X	X			X		X
Teacher J		X		X		X	X		X	
Teacher K	X		X			X		X	X	
Total	**3**	**8**	**2**	**9**	**4**	**7**	**5**	**6**	**4**	**7**

Note. BRP = Big research project; NA = Not applicable

As Table 4-4 shows, in interviews, six teachers (Teacher A, B, C, F, I, K) stated that they had been involved in at least one of the three extended research programs that are offered at Malotha School in grades 9, 10, and 11, while five teachers have not (Teacher D, E, G, H, J). Three teachers have been involved in two of these big research projects: two in BRP9 and BRP10 (Teacher A and K) and one in BRP9 and BRP11 (Teacher H). Seven out of eleven teachers stated that they have not assigned any other big research project to their students (Teacher A, C, D, E, F, G, I). Two out of the four (Teacher B, H, J, K) who have assigned other big research projects are also involved in two of the scheduled programs in grades 9, 10, and 11 (Teacher B, K) and two are not (Teacher H, J). Three teachers (Teacher D, E, G) have not assigned any extended research project and the other eight reported in greater detail about at least one: Teacher A, B, C, F, H, I, J, and K. In addition to the scheduled programs in grade 9, 10, and 11, three other projects assigned by Teacher F, J, and H fell into the group of extended projects.

If teachers at Malotha teach information literacy, small-scale and extended research tasks are the primary mechanisms they use. The next subsection reports findings on information literacy competencies encompassed in research tasks.

4.3.2 Research Tasks Encompassing a Variety of IL Competencies

Claim 3: The research tasks that teachers assign encompass a variety of information literacy competencies.

The research tasks that educators assign cover a variety of information literacy competencies; this claim is supported by the following sub-claims:

- Sub-claim 3a: The research tasks that teachers assign encompass the completion of a process composed of a number of steps.
- Sub-claim 3b: The research tasks that teachers assign encompass the use of information technology (IT), predominantly in order to find information.
- Sub-claim 3c: The research tasks that teachers assign encompass the finding of information in a variety of formats.
- Sub-claim 3d: The research tasks that teachers assign encompass control of information.
- Sub-claim 3e: The research tasks that teachers assign encompass the use of the located information in order to build new knowledge.
- Sub-claim 3f: The research tasks that teachers assign encompass the ethical use of information.
- Sub-claim 3g: The research tasks that teachers assign encompass the presentation of information, predominantly in written format.

For each of the sub-claims, findings from the various sources and collected with the different techniques were compared or triangulated.

Sub-claim 3a: The research tasks that teachers assign encompass the completion of a process composed of a number of steps.

For the sub-claim that teachers have students go through research projects as processes composed of a number of steps, evidence was found only in data from teachers (internal perspective) and predominantly for extended research tasks. In questionnaires, six out of the 15 and in interviews all eight participants who had already assigned extended research

projects described them as processes composed of sequences of steps through which they wanted students to go through. In questionnaires, Teacher 17 wrote, for example, that "these projects are staged so that students complete portions of projects for discussion" (QT17, par. 8) and Teacher 19 noted that his projects are "process driven, step by step" (QT19, par. 8). In interviews, for example, Teacher H said that extended projects are "things [that] have stages, and they go piece to piece to piece" (Teacher H, par. 50). Talking about BRP10, Teacher A noted: "Our emphasis is not just on the final paper. It's on the process" (Teacher A, par. 68). Teacher K described it as a linear process: "Our process in gleaning information is step by step, it's one is leading into the next into the next" (Teacher K, par. 41). Teacher C noted that "it's just doable steps all the way along, just one little step at a time" (Teacher C, par. 78).

Sub-claim 3b: The research tasks that teachers assign encompass the use of information technology (IT), predominantly in order to find information.

Administrators and students (external perspective) reported about students using information technology in the context of research tasks. Table 4-5 provides an overview.

Table 4-5: IT Use in Research Tasks

Perspective	IT Use Role	Computers, incl. laptops	Reasons	
			Information location	Information presentation
External	**Administrators**	4/4	4/4	1/4
	Students	6/6	6/6	3/6
Internal	**Teachers** *(Questionnaires)*	14/21	14/21	4/21
	Teachers *(Interviews)*	11/11	11/11	3/11

All four administrators and all six students explained that students use information technology for information finding. For example, Student 6 stated that teachers support the use of laptops for short searches in class and described how it enhances the depth of discussions:

> I think that I've noticed a lot of kids bringing their laptops to class, and I think that's really helpful. Because like when we start having a discussion in class, it's easier to look up that information and to locate it online very quickly, and you can get answers in the class about the discussion a lot quicker. And I think that the teachers are more welcome to having that source of information there from the students. And they- You can really

> get deeper into a conversation because you have that access to the information. (Student 6, par. 49)

Only one administrator and three students mentioned the use of information technology by students for the presentation of information.

Teachers themselves also reported about it (internal perspective). In questionnaires, 14 teachers out of the 21 who assigned research projects reported about students using information technology in extended or small-scale research projects or both. All of them mentioned the use of information technology for the location of information and four of them also for the presentation of information. In interviews, all 11 teachers reported about students using computers, including laptops, for information location, while only three of them for the presentation of information. For example, in the context of his extended project, Teacher J created a template for the final portfolio that he made accessible for students on the internet:

> This was also posted on the internet, so that way they could access it at home anytime. And I created a template for them, so all they had to do was double-click and change some things in here and then they would have exactly what it should be like. Because I wanted it to be a very professional sort of final portfolio of all their hard work that they had done. (Teacher J, par. 35).

Students using information technology in the research tasks their teachers assign and mainly for information location is a well-supported claim.

Sub-claim 3c: The research tasks that teachers assign encompass the finding of information in a variety of formats.

Students locate information in a variety of formats for the research tasks assigned by their educators. The following categories of sources emerged out of the data: books, databases, human sources, museums and archives, popular periodical sources, school library sources, textbooks, visual sources, and web sources. Table 4-6 shows what the various groups of study participants reported about their use in the research tasks teachers assign.

School library resources

At Malotha, school library sources are the most used sources. All administrators and all students (external perspective) reported about them being part of research projects. For example, Student 3 appreciated that from grades 9 to 11, teachers collaborated every year with the library in an extended project, noting: “so we learn how to use it”. He added that he felt

well prepared for college (Student 3, par. 285; 289). Teachers (internal perspective) also reported about their students using library sources: 15 out of the 21 questionnaire participants who assigned research tasks and nine out of the 11 interviewees did so. However, Administrator A emphasized that "there is variety" (Administrator A, par. 77), there are classes that have to use library resources and classes that do not (Administrator A, par. 74-77). Five of the interviewed teachers (Teacher B, E, F, G, I) noted that they do not require students to use library sources at all or not much. Teacher B said he goes with students to the library in order to use the library computer lab (Teacher B, par. 132) and he emphasized that students prefer using the internet rather than library resources: "Yeah, but with regards to the actual library, I don't do too much" (Teacher B, par. 144). Teacher G noted that he does not have his students use the library often anymore (Teacher G, par. 52). Teacher E stated that he does not use the library together with his class anymore or send students there (Teacher E, par. 51). Teacher F explained that in his subject there is no need for students to use library sources (Teacher F, par. 53). Teacher I claimed that he does not work with the library outside the big research project in grade 11 (Teacher I, par. 116).

Table 4-6: Types of Sources in Research Tasks

Pers-pective	Types of sources / Role	School Library	Web Sources	Databases	Books	Popular Periodical Sources	Textbooks	Visual Sources	Museums, Archives	Human Sources
External	**Administrators**	4/4	4/4	1/4	3/4	3/4	2/4	2/4	1/4	0/4
	Students	6/6	5/6	6/6	3/6	0/6	3/6	0/6	0/6	0/6
Internal	**Teachers** *(Questionnaires)*	15/21	11/21	6/21	5/21	2/21	1/21	2/21	0/21	0/21
	Teachers *(Interviews)*	9/11	9/11	7/11	6/11	7/11	4/11	4/11	3/11	3/11

Web sources

The use of web sources in research projects was reported nearly as much as school library sources. The only difference was that five students instead of six and 11 questionnaire participants instead of 15 talked or wrote about them. In interviews teachers reported for example, about their students making extensive use of online sources: Teacher A claimed that

students get much of their information from the web (Teacher A, par. 74), Teacher B reported that he has students use the internet as a source "a lot" (Teacher B, par. 15; 156; 168), and Teacher D noted that he "often" assigns small research tasks where students have to locate online information (Teacher D, par. 41). Teacher K, on the other hand, seemed to be skeptical about students' use of this type of source. He reported about a student searching the web at home, coming up with a good source and then the teacher gave in and finally allowed the student to use it:

> He [the student] realized several weeks into the process of gathering his information for his paper that he missed a big resource. It happened to be a museum, or basically an archive, devoted to his topic, but he didn't know it existed. And quite frankly, I didn't know it existed, either. But he came to me and said, "Mr. [teacher], I've discovered this." – "How did you discover it?" – "Well, I found it searching on the web," of course, "which you see the web is a good thing, it can be a good thing. I found it searching on the web." – "Well, when did you do that?" – "Last night." – " Well, why didn't you do that two weeks ago? If it was just a research on the web, I mean, we're not talking about super advanced technology. You Googled, yes?" – "Yes." (Teacher K, par. 72)

Other teachers reported about preventing students from using particular online research tools or sites, for example, the following two teachers in the context of extended projects: Teacher A did not allow students to use Wikipedia as a source (Teacher A, par. 48) and Teacher J did not allow students to use search engines. For the extended research task he assigned, students spontaneously started using one of them but he prevented them from doing so and directed them towards particular databases:

> When they sat down to first do this [project], everyone went to Google ... and I immediately shut them down on that. And I said, "That will send you anywhere and everywhere, and you don't know what it is you're really looking at." So I made them use the databases. (Teacher J, par. 97)

However, in another project, a Web Quest, he required students to use one other online source in addition to three database sources. He wanted them to see the differences between the two types of sources (Teacher J, par.17). Other teachers directed students to particular sites, for example, Teacher G reported about sending students to websites that were pre-selected and recommended by universities or the teacher organization for his subject (Teacher G, par. 14).

Databases

Only one administrator but all six students reported about the use of databases in research projects, as well as six teachers who participated in questionnaires and seven who participated in interviews. When they explained how their extended projects helped students to become

good information locators in their questionnaires, Teacher 4 wrote that his students "must demonstrate proficiency with databases" (QT4, par. 8) and Teacher 5 noted that they must be "comfortable using data basis [*sic*]" (QT5, par. 8). In his interview, Teacher J reported that students used databases as the main source in his extended research project: "Most students were finding information using the school databases. ... They were really big, they were really influential for this project" (Teacher J, par. 92). He required them to use this type of source because he wanted students to see the advantages of using databases as compared to a search engine:

> I wanted them to see that, 'Here at the school, we have so many databases, so many great resources for you to use, stop going to Google. You can access them anytime where there is a computer and an internet connection, that's what you want to go to'" (Teacher J, par. 99).

Student 2 described it as an evolution taking place at Malotha School. He stated that since grade 9, "more teachers" have required students to use databases, also for small research assignments: "More teachers are pushing for their students to use databases ... So, that it doesn't feel like the [extended] research paper itself is like a disjointed element in your education" (Student 2, par. 281). He mentioned the example of a small research project in a language class and added: "And I feel like that's kind of taking the elements that you would have once only used for research papers, and bringing it into your class, so you're more used to it" (Student 2, par. 283).

Books

The use of books was reported by similar numbers of teachers (5/21 in questionnaires and 6/11 in interviews), as well as more administrators (3/4) and fewer students (3/6). Teacher G explained in his interview that he had students use books mainly from his classroom collection, not from the library. He emphasized that these were sources that he selected, that were already used successfully with other classes, and that he felt "comfortable with" (Teacher G, par. 14). Also in interviews, three teachers (Teacher B, H, J) emphasized that students used books to a lesser extent than other sources. Teacher B said: "Like actual, physical-; the books in the library, no, we, I don't use that too much" (Teacher B, par. 144). Teacher H explained that most of his students used online sources and only a minority used books (Teacher H, par. 72). Teacher J noted that although students were allowed to use books, they "very rarely" did so (Teacher J, par. 46; 92).

Popular periodical sources

In interviews, mainly administrators (3/4) and teachers (7/11) talked about popular periodical sources, whereas students did not mention them at all; in questionnaires, only two teachers referred to these sources. In his interview, Teacher A reported that his students have to locate information in newspapers and magazines "in any given week" and that he uses it in order to teach evaluation of sources (Teacher A, par. 16). He also explained that he regularly had students locate information in newspapers to support an argument in order to prepare an extended research project (Teacher A, par. 50). Teacher E reported about online sources replacing the use of printed newspapers, he explained: "Prior to the internet becoming really big- Going back six years ago, when I was teaching, they would cut stuff out of the newspapers and make a poster. But now, that's over" (Teacher E, par. 38).

Textbooks

The use of textbooks as sources was reported by half of the administrators, half of the students, and four of the interviewed teachers but only one questionnaire participant. In his interview, Teacher B explained that textbooks are one of the sources his students get information from when he teaches information location, evaluation, and use, noting: "I teach it in a variety of ways really, from the standard old-fashioned, get-it-out-the-textbook type of way all the way up to researching blogs, researching the Internet, and anywhere in between, really" (Teacher B, par. 15). He emphasized that he perceives textbooks as information-rich sources and makes much use of them (Teacher B, par. 26). Teacher E reported about two small research assignments, one with optional (Teacher E, par. 22) and one with required use (Teacher E, par. 125) of the textbook as a source. In his classes, Teacher F uses the textbook as a source of information in addition to online information (Teacher F, par. 13). Administrator B claimed that "between 5 and 25 percent" of their teachers do not have students use any other information than that from textbooks (Administrator B, par. 18; 26).

Visual sources

Only two administrators, two teachers in questionnaires, and four in interviews reported about students using visual sources; no student cited this source. For example, Teacher B reported that in his small research projects, students might find information in online videos (Teacher B, par. 102). He also talked about a project where the whole class went to a cinema so that students could locate information in a movie (Teacher B, par. 108).

Museum and archive resources

Only a minority of participants (one administrator and three interviewed teachers) reported about students using sources from museums or archives. For example, Teacher A went with a group to a particular museum that provided information about the topics of "a handful of students" (Teacher A, par. 44).

Human sources

The only study participants who mentioned human sources were teachers and they did so in interviews only (3/11). For example, Teacher B noted that he requires his students "a lot" to find information from human sources (Teacher B, par. 15). He talked about a project where he told all his students to find information through interviews with friends and family members:

> So one method was I had them interview their friends who had no idea about it, like 15, 16 year old guys and girls who they've only ever known [topic] and then also interview their mom and dad and their grandfathers ... So they got first hand experience of interviewing people. And then they could compare people who've only ever known [topic] to people who had known both sides of it, and then they could discuss the answers. (Teacher B, par. 15; 18)

In an extended project, Teacher J required all his students to use at least one human source with the aim of gaining an external perspective that would enhance their own thinking. He told his students to think about "interviewing someone as a form of research", and to consider it as follows: "How can I learn more about [the topic] by actually having interaction with someone else and gaining their perspectives through an interview format?" (Teacher J, par. 32).

Variety of sources

The most used sources at Malotha are the school library and almost to the same extent web sources, followed by databases and books, popular periodical sources, textbooks, visual sources, museums and archives, and human sources. Even if students do not have to use an enormous variety of sources in each singular research project, given the numerous projects they go through during their school career, Malotha students learn how to locate information using various sources and formats and develop complementary skills. With regard to the big, scheduled research programs in grades 9, 10, 11, Administrator C stated that students learn different ways of searching for information (Administrator C, par. 53). When he compared the two programs in grades 10 and 11, Administrator D claimed:

> So, I think both approaches that the [language] teachers and the science teachers take are not only valid but I think ask the kids to learn different skills. Sometimes those skills complement one another, sometimes those skills will be more useful. ... But having done both, I think, exposes them to a variety of sources, a variety of types of information. (Administrator D, par. 43)

In the next subsection findings will be presented for controlling information.

Sub-claim 3d: The research tasks that teachers assign encompass control of information.

Teachers requiring students to control information in research tasks were not reported much, only teachers themselves mentioned it and only in interviews. Four out of the eight teachers who had assigned extended research tasks reported about students learning to control information. For example, Teacher F said that his students learned to organize information on computers (Teacher F, par. 19): "So, basically that's the gathering phase where they gather and sort this information, 'This goes in the photos' folder, this goes in the video folder, this goes in my text folder,' and so forth" (Teacher F, par. 19). Teacher C and Teacher I explained that students had "a file" (Teacher C, par. 102) or "folders" (Teacher I, par. 98; 102) where they collected printed copies of all the materials they gathered during the search process in BRP11. Teacher J had his students keep a research log during the location phase: "I would make them keep a research log. So that way they wouldn't say, 'Well, I found that great article about [topic] and now I don't know where it is'" (Teacher J, par. 92). In addition, Teacher J had his students keep "a final portfolio of all their rough draft and final draft products and information", which they had to submit (Teacher J, par. 22). He allowed students to organize information in print form and electronically (Teacher J, par. 35).

Sub-claim 3e: The research tasks that teachers assign encompass the use of the located information in order to build new knowledge.

When their students undertake research tasks, teachers require them to use the information they located in order to build new knowledge. Aspects that participants addressed were students evaluating sources and information within sources, engaging with information, extracting information, analyzing information, and developing a personal perspective. Table 4-7 shows what the various groups of study participants reported about the coverage of these competencies in the research tasks that teachers assign.

Table 4-7: Knowledge Building in Research Tasks

Perspective	Knowledge building / Role	Evaluation	Engagement: Reading	Extraction	Analysis
External	**Administrators**	3/4	3/4	1/4	2/4
	Students	0/6	4/6	2/6	1/6
Internal	**Teachers** *(Questionnaires)*	7/21	ND	3/21	11/21
	Teachers *(Interviews)*	8/11	11/11	6/11	8/11

Note. ND = No data available

It was not possible to isolate evidence about engagement with information in teacher questionnaires. In interviews, almost all participants talked about students' engagement with information, predominantly in the form of reading. Four out of the six students and three out of the four administrators reported about it (external perspective). For example, Student 4, supported by three others, and Administrator B emphasized that students had to read articles of high academic level in BRP11 (Administrator B, par. 85; Student 4, par. 223; Focus Group Discussion, par. 225). Student 5 reported also about this project and stressed that they would print the texts they located in databases and stressed that they were required to read each text as a whole: "Then we'd get the papers and we'd print them out, and we'd have to read the whole entire article, meaning like what- 20 pages or whatever" (Student 5, par. 201). All interviewed teachers (internal perspective) held that students had to read in order to engage with information. For example, Teacher A stated that his students do different types of reading: a more superficial one for topic selection, "in the library ... they read a little bit about what they might be interested in" (Teacher A, par. 29), and then a more in-depth one when they read the materials they gathered about the selected topic (Teacher A, par. 101). Teacher F talked about students reading information in electronic (Teacher F, par. 25) and print format (Teacher F, par. 41).

Of the other three aspects, teachers requiring students to analyze the information they collected was reported by the highest number of teachers (internal perspective): 11 out of the 21 questionnaire participants who had assigned research tasks did so and eight out of the 11 interviewed teachers. Examples from questionnaires included Teacher 5 noting that "in terms of 'use' of information, [he has] students use internet sources to develop a persuasive argument for class [title]" (QT5, par. 10) and Teacher 19 stated that "these types of essays

fuse [underlined] both researched critical thinking and evaluation along with former perspective of the student" (QT19, par. 11). Examples from interviews included Teacher C explaining that analysis, although it is a minor part in BRP11 (Teacher C, par. 17), which encompasses "comparing and contrasting" in order to identify similarities of and differences between sources (Teacher C, par. 23), helps him to identify each student's level of understanding and learning:

> I like the analysis part because it shows me how well they understood the [article], because they're starting to use them and starting to think about them. So, it shows me the level of competency that they have acquired, the way they can talk about them. ... It shows me if- ... If they understand it better and get the full grasp of a certain [article] ... I get a better feeling for what they've learned from the analysis. (Teacher C, par. 23-27)

Teacher J stated that it is crucial that students take the time to search different perspectives on their topic: "I want them to know that everything is out there and that they need to pick through it all and gather lots of perspectives and ideas and then formulate their own conclusion about it" (Teacher J, par. 54). He also noted the importance of using information in a variety formats:

> I think that what's really important is to have students look at a variety of sources, read a variety of articles or primary source documents ... And have them read multiple different types. And then kind of take all of those eclectic sources and gain their own perspective and opinion and view based on that. (Teacher J, par. 16)

Two administrators and one student talked about it (external perspective).

Teachers requiring students to evaluate information is a well-supported claim. Teachers themselves reported about it in great detail (internal perspective) with eight out of the eleven interview participants doing so. For example, Teacher A emphasized that not only the quality of sources but also the quality of the information students extract from sources is important to him (Teacher A, par. 43). Teacher F claimed that students need to learn how to identify which information "is authoritative", which "is knowledgeable" and which "is opinion" (Teacher F, par. 32). Teacher K explained that students need to evaluate information for usefulness with regard to the assignment:

> And then, of course, the next step is to help them determine what kind of information is valuable. And I think they get the hang of that once they realize what information might be useful and what isn't, given the particular assignment, given the tone of the assignment, the type of the assignment, the scope of the assignment, all of these things go into what type of information is valuable. (Teacher K, par. 15)

In questionnaires, seven teachers wrote about having students evaluate information. For example, Teacher 7 wrote that his students have to "determine the validity of the information" (QT3, par. 11) and Teacher 18 noted that "by exposing students to various points of view on an issue they are forced to evaluate and decide the verasity [*sic*]" (QT18, par. 10). Students did not talk about evaluation but three of the administrators did (external perspective). For example, Administrator C claimed that all students learn how to evaluate online information for validity (Administrator C, par. 21; 23).

Extraction of information was mentioned by the fewest number of teachers, both in questionnaires and interviews (internal perspective). Six out of the 11 interview participants explicitly stated that it was part of the research tasks they assigned. In questionnaires, only three teachers wrote about it, for example, Teacher 5 stated that his students "practice ... summarizing peer reviewed articles. Practice discerning common threads and themes in scientific studies" (QT5, par. 8). The fewest number of administrators mentioned extraction, but two students talked about it in great detail (external perspective). They described how they were required to make summaries in their own words in BRP11 and how that procedure helped them to write their paper. Student 5 explained:

> So you would read an article and you would read the whole thing, and then you would turn it over, and you would just start writing what you read. And I mean I did- I kind of turned back if I forgot it, because sometimes the articles were 20 pages. (Student 5, par. 207)

And Student 3 added:

> Yeah, they did ask you to basically summarize it in your own words, on how or what you took from the article, or what interests you from the article, and from there you would work on your paper. So you would have basically 5-, 20-page things. You would write, you'd write, you'd write, and then what you wrote on the back is your paper. Pretty much those are your ideas and what you're going to use for your paper because that's what interests you, and that's what you took from the information. So with that you would, with that information you'd type it on the computer. (Student 3, par. 208)

Both emphasized the usefulness of the strategy, with Student 3 noting that it helped him to "memorize a lot more" (Student 3, par. 202) and Student 5 emphasizing that "it helps you to really like soak the information in" (Student 5, par. 207).

Apart from engagement with information, for which no data were available from teacher questionnaires and that was mentioned in interviews with all groups of participants

predominantly in the form of reading, aspects related to information analysis were reported by the highest number of participants, then information evaluation and extraction.

Sub-claim 3f: The research tasks that teachers assign encompass the ethical use of information.

Study participants talked about teachers having and not having students document the sources they use. Table 4-8 gives an overview. As far as the external perspective is concerned, only one administrator and five out of the six students addressed the issue. Administrator B talked about "a short research project" in which students used a presentation software without documenting their sources: He claimed that there are teachers who do not expect students to use the citation rules that they use for papers for other media (Administrator B, par. 50). In the focus group discussion five students reported in great detail that at Malotha School plagiarism is an important issue for teachers and that they do require students to document their sources (Student 1, par. 175; Student 3, par. 123, 173; Student 2, par. 148, 150; Student 5, par. 152, 156, 169; Student 6, par. 161). The students were all in grade 12. They claimed that they have learned how to cite sources since grade 9 (Student 5, par. 169). Student 3 stated that they "are kind of conditioned not to [plagiarize]" (Student 3, par. 171) whereas Student 1 explained that they have learned it in great detail: "So, I mean you have to take everything with a grain of salt, and I think as we've gotten older, we've known how to really cite correctly" (Student 1, par. 181).

Table 4-8: Ethical use of Information in Research Tasks

Perspective	**Role**	**Teachers requiring students to document sources**	
		Yes	**No**
External	**Administrators**	0/4	1/4
	Students	5/6	0/6
Internal	**Teacher** *(Questionnaires)*	0/21	0/21
	Teacher *(Interviews)*	7/11	0/11

As far as the internal perspective is concerned, teachers only reported about the documentation of sources in interviews, with seven out of the 11 teachers doing so. For example, Teacher K stated that citing sources is a matter of "responsibility" (Teacher K, par.

44). Teacher A reported that his students learn how to paraphrase and to quote directly (Teacher A, par. 50) and they learn how to use a specific format, MLA (Teacher A, par. 52). Teacher F stated that his students have to document all the sources they use, regardless of the format of the media, for example, photos (Teacher F, par. 19). None of the 21 questionnaire participants who had assigned research tasks wrote about this aspect of information literacy.

Sub-claim 3g: The research tasks that teachers assign encompass the presentation of information, predominantly in written format.

Study participants stated that teachers expect students to present information when they undertake research, mentioning written, oral, visual, electronic, and creative formats, with written format reported the most (Table 4-9). Nine out of the 11 interviewed teachers and more than half of questionnaire participants reported about doing so (internal perspective). Four out of the six students also reported about written information products they had to present and one of the administrators also mentioned this format (external perspective).

Five teachers in both interviews and questionnaires reported oral format, whereas only one administrator mentioned the format and zero students. Visual format was reported by one of the interviewed teachers, five questionnaire participants wrote about it, and only one administrator but no student addressed it. Electronic format was mentioned by one of the interviewed teachers and four teachers in questionnaires, while creative formats by two teachers in interviews and three in questionnaires. Administrators and students did not mention electronic or creative formats.

Table 4-9: Information Presentation in Research Tasks

Perspective	Types of Presentation / Role	Written format	Oral format	Visual format	Electronic format	Creative format
External	**Administrators**	1/4	1/4	1/4	0/4	0/4
	Students	4/6	0/6	0/6	0/6	0/6
Internal	**Teachers** *(Questionnaires)*	11/21	5/21	5/21	4/21	3/6
	Teachers *(Interviews)*	9/11	5/11	1/11	1/11	2/11

In the context of extended research tasks, four teachers reported about requiring students to go through a revision process; they had them submit draft versions of their papers (Teacher A, par. 52; Teacher C, par. 87; Teacher I, par. 88; Teacher J, par. 22). Teacher J used a revision process during which not only the teachers but also fellow students read and made comments on draft versions (Teacher J, par. 66). Teacher H dealt with it in a different way. He explained that he did not want students to formally hand in any draft versions, noting:

> I know, in some cases, if it's like paper writing, you grade like a rough draft or a second draft and then a final draft. But I rather just give them feedback on what they're doing and take the emphasis off on kind of what grade they're getting or how they are being evaluated. (Teacher H, par. 50)

Four teachers talked about wanting students to structure the information they extracted. For example, Teacher B and Teacher I claimed that in their extended research projects students learn to write a paper that has a "proper structure" (Teacher I, par. 56) or a "scientific structure ...: Does this follow this follow this follow this, does this have evidence?" (Teacher B, par. 68). One teacher (Teacher H) said that he wanted students to adapt their presentation to their audience. In the project that he assigned, the intended audience was a group of younger students and he explicitly stated that his students learned to adapt their presentation to this particular audience (Teacher H, par. 72).

Summary for information literacy competencies in research tasks

The research tasks that Malotha teachers assign encompass a variety of information literacy competencies, which are grouped into the following categories: completing the research tasks as a process composed of a number of steps, using information technology, finding information, controlling information, building knowledge, using information in ethical ways, and presenting information. Four of them, the use of information technology, information finding, knowledge building, and presentation of information are strongly supported as evidenced in interviews with administrators and/or students (external perspective), as well as teacher questionnaires and/or interviews (internal perspective). The next most supported was students having to execute a project as a process composed of a number of steps; it was reported for extended projects solely and only by teachers, but they did so in questionnaires and interviews. A minority of participants said that students had to control information in research projects: only educators did so, only in interviews (4/11), and only in the context of extended research tasks. The findings for the ethical use of information were contradictory. Students (5/6) emphasized that teachers require them to document their sources, whereas one

administrator provided the example of a teacher who did not do so. Findings from teachers were also controversial: while an important number of them (7/11) reported in interviews about their students having to document sources in research tasks, none of the 26 teachers did so in questionnaires.

For the information literacy categories use of information technology, information finding, knowledge building, and information presentation sub-categories could be identified. The best supported competencies within them are the following: Teachers require students to use information technology when they undertake research tasks for information location in the first place and to a lesser extent for the presentation of information. In the category of information finding, school library sources are the most used sources, closely followed by web sources. Other sources that teachers have students utilize include databases, books, popular periodical sources, textbooks, visual sources, museums and archives, and human sources. Even if students use a limited number of sources in each singular research project, taking the projects together, which they go through during their school career, students learn how to locate information in various sources and formats and develop complementary concepts and competencies. For knowledge building four sub-categories were identified: evaluation, engagement, extraction, and analysis. For engagement with information, no data were available from teacher questionnaires, but as far as the data from the other sources showed, it seems to take place predominantly in the form of reading and to a lesser extent also through listening and viewing. Information analysis in order to develop a personal perspective and evaluation are of particular interest to teachers when students undertake research, extraction of information was reported the fewest. Information presentation is part of research tasks, mostly in written format, but it also happens orally, visually, electronically, and in creative ways. Only teachers reported on electronic and creative presentations, none of the external participants mentioned them.

4.3.3 Intervening Conditions

There are a number of factors that influence teachers' practices of information literacy teaching. Two claims were developed:

Claim 4: The type of class shapes the decision to teach information literacy.

Claim 5: The scope of the research task and the knowledge domain shape the information literacy competencies encompassed in research tasks.

The latter is presented in the form of the following sub-claims:

- Sub-claim 5a: The scope of the research task shapes the information literacy competencies that are involved in research tasks.
- Sub-claim 5b: The knowledge domain shapes the information literacy competencies that are involved in research tasks.

Based on findings in the pilot study, a third sub-claim was developed about the length of teaching experience shaping information literacy competencies in research tasks. At Malotha not enough evidence to maintain that claim could be found.

4.3.3.1 The type of class

Claim 4: The type of class shapes the decision to teach information literacy.

Data about this claim was available from interviews only. Administrators and students reported about differences in information literacy teaching within subject areas. Administrator D explained that within a particular department, information literacy teaching might be different from one teacher to another (Administrator D, par. 47). When Administrator B talked about those teachers at their school who stick to teaching subject content and do not teach information literacy at all, he gave the example of AP teachers in general and that of a particular AP history teacher:

> But he would not let his students do anything else. That's all he would do [teaching subject content]. So- And he's a superb teacher. But his job, as he sees it, is to have as many kids as possible get a five on the AP [subject area] test, and they do. But he has done nothing to teach them about the information field of [subject area], only about what is in the direct, strict curriculum. (Administrator B, par. 24)

Student 3 reported about his experiences in BRP11 with an AP science teacher who lacked interest in the project and wanted to teach subject content instead of letting students go to the library (Student 3, par. 253), and Student 1 wondered if there was a relationship between lower grades on AP tests for a particular course and the fact that it had been heavily involved in BRP11 (Student 1, par. 279). Reasons for AP teachers' reluctance to teach information literacy, which administrators and students mentioned, were the fact that "the AP curriculum is very strict in most courses" (Administrator B, par. 24), AP teachers perceiving their role as preparing students for standardized tests (Administrator B, par. 24), and the pressure to get as

many students as possible to pass the test with high scores (Administrator B, par. 24, par. 26; Student 3, par. 257).

Three teachers (Teacher E, H, I) reported about choosing different approaches to information literacy teaching depending on the level of class. Teacher H and Teacher I explained that they require students to handle information on their own in elective classes (Teacher H, par. 18, par. 108; Teacher I, par. 174). Teacher H noted: "It's an elective class where every topic was chosen by the students, researched by the students, they gave presentations and then there was discussion or debate on those topics" (Teacher H, par. 18). Teacher I emphasized that letting students decide on the content they want to learn and letting them engage actively with information is easier in elective classes (Teacher I, par. 166; 174). Teacher E explained that he transmits all relevant information to regular students and in addition he may require them to do a poster (Teacher E, par. 22) or a short presentation (Teacher E, par. 23, par. 40) as an opportunity to improve their grades or enhance their interest in the course:

> I'm using more for the kids that are not advanced in [course title], and I'm using that to help with their grades or maybe for a little diversion, they're not as interested in the subject, and so this adds some variety to the classroom. (Teacher E, par. 98)

He would not assign the same type of research project to an AP or honors class because of time and curriculum pressure and because these students are more ambitious and "focused" and do not need any "diversion" or "variety" (Teacher E, par. 97-113). Instead, he would require them to solve a problem at home that he has not explicitly addressed in class and to find the information needed on their own (Teacher E, par. 127). He described it as way to prepare them for their professional lives (Teacher E, par. 126). Teacher H also distinguished between the pedagogical approach he uses in a regular and an AP class. He opts for student-centered teaching in regular classes:

> But, really, the interest that they have in a subject, I think, can really be brought out by their own involvement in working with the material, with their peers, and really leading the discussion and leading the class in that way. So far a class like that, I just see myself more as a moderator and less of a role of providing a lot of information for them, just kind of keep them in the right track and the right path. And so that's an interesting class. (Teacher H, par. 13)

And he uses a teacher-centered approach in AP classes. He explained:

> And so it's less student-driven that class, I guess, it's more me providing information and giving them questions to think about and covering main themes and analyzing [topic]. But there is less time for them to do the research, so they just kind of have to

> be, “This is where the information is. And this is what you need to know. Know it. “And that’s it for that class. (Teacher H, par. 14)

The reasons for the different approach in AP classes he mentioned were rigorous curriculum requirements, time pressure, and high expectations with regard to student test scores:

> I’m very much entrenched in a specific curriculum where I can’t really deviate, and I have to stick to a specific time, timeline, whether I have covered a subject enough or not. I always need to push the material forward in that class, because there is a set test date and a national test for the end of the year, which our students are expected to do really well on. (Teacher H, par. 14)

Teacher C, who did require his AP students to undertake an extended research project, described time pressure as the most difficult aspect he and his students had to deal with (Teacher C, par. 29).

Summary for type of class

The type of class shapes the decision to teach information literacy. There is evidence from interviews only, that is, from those with administrators (2/4) and students (2/6) (external perspective) and those with teachers (3/11) (internal perspective). These respondents stated that assigning research tasks to AP classes is particularly challenging for teachers because of rigorous curriculum requirements, time pressure, and the school’s high expectations regarding students’ results on national tests. As a consequence, teachers are less likely to teach information literacy to AP classes. Two teachers emphasized that elective classes lend themselves particularly well for individual student research. However, a third teacher regularly assigns extended research tasks in an AP class but identified time management as the most challenging aspect for himself and his students.

In the next two subsections findings for intervening conditions regarding information literacy competencies covered in research tasks are presented.

4.3.3.2 The scope of the research task

Sub-claim 5a: The scope of the research task shapes the information literacy competencies that are involved in research tasks.

Depending on the scope of the research that teachers have students undertake, there are differences between the categories of information literacy covered as well as differences

within categories. Out of the seven categories that are part of research tasks that Malotha teachers assign, three were mentioned predominantly in the context of extended research tasks: information process, ethical use of information, and information control. In questionnaires, six out of the 15 teachers who had already assigned extensive research tasks stated that their students went through various steps. All eight interviewed educators who had already assigned big research projects explained that they were processes composed of sequences of steps through which they had students go. Only one teacher - and he did so in a questionnaire - mentioned the process as such in the context of small tasks. The ethical use of information tends to be part of extended rather than small-scale research tasks. Teachers reported about requiring students to document sources only in interviews: seven in the context of extended and only two of them when they talked about small-scale projects. The sole administrator who talked about this information literacy competency reported about a small research project in which the teacher did not require students to document the sources they used. If teachers require students to take control of information at all, they tend to do it in extended research tasks. The only study participants who addressed this information literacy aspect were teachers, and they did it only in interviews. Four out of the eight teachers who had assigned extended research tasks reported about requiring students to control information. No teacher talked about it in the context of small-scale research tasks.

Other differences between extended and small-scale research tasks were found within each of the following information literacy categories: information finding, knowledge building, and information presentation. With regard to the location of information, findings indicate that school library sources are the predominant sources in extended research tasks whereas web sources are prevalent in small-scale projects. This part of the sub-claim is supported by evidence from interviews with administrators and students (external perspective) as well as teacher questionnaires and interviews (internal perspective). For extended research projects (Table 4-10), the vast majority of participants (4/4 administrators, 6/6 students, and out of those teachers who had assigned this type of research task 8/8 in interviews and 13/15 in questionnaires) stated that educators had students use school library sources, whereas for small-scale research tasks (Table 4-11) the vast majority of respondents (4/4 administrators, 5/6 students, and out of the teachers who had assigned this type of research task 8/9 in interviews and 7/20 in questionnaires) reported about students using web sources. Web sources play a minor role in extended projects, and the school library comes second in small-scale projects. Databases are the second most used sources in extended projects but are less important in small projects. Books as sources were mentioned by about a third of teachers as

being part of extended projects and by about a sixth of teachers as being part of small-scale projects.

Table 4-10: Types of Sources in Extended Research Tasks (Excerpt)

Perspective	**Types of sources** / **Role**	**School Library Sources**	**Databases**	**Books**	**Web Sources**	**...**
External	**Administrators (A)**	4/4	1/4	1/4	0/4	
	Students (S)	6/6	6/6	0/6	0/6	
	TOTAL A + S	**10/10**	**7/10**	**1/10**	**0/10**	
Internal	**Teachers** *(Questionnaire)*	13/15	5/15	4/15	4/15	
	Teachers *(Interviews)*	8/8	7/8	4/8	4/8	
	TOTAL Teachers	**21/23**	**12/23**	**8/23**	**8/23**	

Table 4-11: Types of Sources in Small-Scale Research Tasks (Excerpt)

Perspective	**Types of sources** / **Role**	**Web Sources**	**School Library Sources**	**Books**	**...**	**Databases**	**...**
External	**Administrators (A)**	4/4	4/4	3/4		1/4	
	Students (S)	5/6	3/6	3/6		3/6	
	TOTAL A + S	**9/10**	**7/10**	**6/10**		**4/10**	
Internal	**Teachers** *(Questionnaire)*	7/20	5/20	1/20		1/20	
	Teachers *(Interviews)*	8/9	5/9	4/9		3/9	
	TOTAL Teachers	**15/29**	**10/29**	**5/29**		**4/29**	

Within the category of knowledge building there are differences between extended and small-scale research tasks regarding the form of student engagement with information and student analysis of information. Participants talked about the students' engagement with information in research tasks predominantly in the form of reading, but also in the forms of listening and viewing. However, with regard to the latter, there are differences that seem to depend on the scope of research tasks: viewing seems to be part of small rather than extended research tasks. Students did not mention it at all and there was no data from questionnaires available for this competency, but two out of the four administrators mentioned viewing only in the context of small-scale research (Table 4-12). And in interviews, only one out of the eight teachers who had assigned extended research tasks mentioned it whereas five out of the nine who had assigned small-scale tasks did so.

Table 4-12: Viewing as a Form of Engagement with Information by Scope of Task

		Scope of research tasks	
Perspective	**Role**	**Extended**	**Small-scale**
External	**Administrators**	0/4	2/4
	Students	0/6	0/6
Internal	**Teachers** *(Questionnaire)*	ND	ND
	Teachers *(Interviews)*	1/8	5/9

Note. ND = No data available

The findings for students analyzing the information they collected in order to develop a personal perspective are contradictory. There is strong evidence from teachers that it is part of extended rather than small-scale research tasks: seven out of the eight teachers who had assigned extended research tasks reported about this information literacy competency being part of their projects, whereas only three out of the nine teachers who had assigned small-scale research tasks did so (Table 4-13). Similarly, in questionnaires, seven out of the 15 teachers who had assigned extended projects wrote that students had to analyze the information whereas only five out of twenty teachers did for small projects. This part of the sub-claim is not supported by evidence from interviews with administrators and students. The latter talked about information analysis only in the context of small-scale tasks and administrators also mentioned it more for small research (two administrators) than extended (one administrator).

Table 4-13: Analysis by Scope of Task

Perspective	Role	Scope of research tasks	
		Extended	Small-scale
External	**Administrators**	1/4	2/4
	Students	0/6	1/6
Internal	**Teachers** *(Questionnaire)*	7/15	5/20
	Teachers *(Interviews)*	7/8	3/9

For the category of information presentation there are indications that there are differences in formats between extended and small-scale research tasks. Most reported for student presentation was written format. If oral format is used, it tends to be part of small rather than extended research tasks (Table 4-14).

Table 4-14: Oral Presentations by Scope of Task

Perspective	Role	Scope of research tasks	
		Extended	Small-scale
External	**Administrators**	0/4	1/4
	Students	0/6	0/6
Internal	**Teachers** *(Questionnaire)*	1/15	4/20
	Teachers *(Interviews)*	3/8	4/9

The administrator who reported about oral formats did so for small tasks only. More evidence was available from teachers. In questionnaires, only one out of 15 mentioned oral format in the context of extended tasks, but four out of twenty did so for small tasks. In interviews, three out of eight participants mentioned oral formats for extended and four out of nine for small research tasks.

Summary for scope of research tasks

The categories of information literacy that are covered in the research that teachers have students undertake depend partly on the scope of the tasks. Strongly supported is that the ethical use of information tends to be part of big rather than small-scale projects (ERT: 7/8 interviewed teachers vs. SRT: 2/9 interviewed teachers, and an administrator who reported about a teacher who did not require students to cite sources), and that students go

predominantly through extended information projects as processes composed of a number of steps; for the latter there is only evidence from the internal perspective but the evidence is strong (ERT: 8/8 teachers in interviews, 6/15 in questionnaires vs. SRT: 0/9 in interviews, 1/20 in questionnaires). Weaker is the support for students controlling information; it was only reported by teachers in interviews and only for extended research tasks (4/8 educators).

The scope of the tasks also shapes information literacy competencies within categories. Strongly supported is the finding about the category of information finding, according to which school library sources and databases tend to be the predominant sources in extended projects and web sources the prevailing in small-scale projects. There was strong evidence from administrators and students (external perspective) and teacher questionnaire and interviews (internal perspective) to support this part of the claim (Table 4-10 and Table 4-11). The next two findings have weaker support. In the category of knowledge building, engagement with information in the form of viewing tends to be part of small projects, a finding supported by evidence from administrators (SRT: 2/4 vs. ERT: 0/4) and teacher interviews (SRT: 5/9 vs. ERT: 1/8). Information presentation in oral formats tends also to be part of small-scale rather than extended projects, a finding supported by evidence from one administrator (SRT: 1/4 vs. ERT: 0/4) and teachers in questionnaires (SRT: 4/20 vs. ERT: 1/15) and interviews (SRT: 4/9 vs. ERT: 3/8). Evidence that analysis of information in order to develop a personal perspective is part predominantly of extended tasks was controversial: there was strong support from teacher questionnaires (ERT: 7/15 vs. SRT: 5/20) and interviews (ERT: 7/8 vs. SRT: 3/9) but it was contradicted in interviews with administrators (ERT: 1/4 vs. SRT: 2/4) and students (ERT: 0/6 vs. SRT: 1/6).

4.3.3.3 The knowledge domain

Sub-claim 5b: The knowledge domain shapes the information literacy competencies that are involved in research tasks.

There are several indications that the information literacy competencies that are encompassed in the research tasks that teachers assign depend partly on the knowledge domain. Repartition among subject groups of the 26 teachers who completed a questionnaire is shown in Table 3-2 and that of the 11 teachers who participated in interviews in Table 3-5. Evidence for the knowledge domain shaping information literacy competencies encompassed in research tasks was found for knowledge building (engagement and evaluation), ethical use of information,

information process, and information presentation, and is reported here in order of the strength of the support, beginning with the strongest and ending with contradictory.

For differences between subject groups regarding information presentation, there was evidence from administrator interviews as well as teacher questionnaires and interviews. Most teachers require students to present information in written formats when they undertake research. However, some differences occurred regarding visual, electronic, and creative formats, which seem to be part of projects assigned by math and science as well as history teachers rather than those assigned by language teachers. Administrator B reported about a history teacher who had students use a visual format (Administrator B, par. 40). The five questionnaire participants who wrote about visual format were math and science teachers (4/5) or history teachers (1/5); see Table 4-15 for an overview. The only teacher who talked about visual format in interviews was also a math and science teacher. Students presenting information in creative ways was only reported by history teachers as well as math and science teachers. Only one participant, a math and science teacher, reported in an interview that his students presented information in electronic formats, while this was reported by four teachers in questionnaires out of which three teachers also taught math and science. Only one language teacher mentioned one of the three formats; he was a questionnaire participant and wrote about his students using electronic format.

Table 4-15: Types of Information Presentation by Subjects

Subject	**Source**	**Types of presentation**		
		Visual format	**Electronic format**	**Creative format**
History	Teacher questionnaires	QT17		QT17, QT20
	Teacher interviews			Teacher H
Languages	Teacher questionnaires		QT19	
	Teacher interviews			
Math and Science	Teacher questionnaires	QT6, QT12, QT14, QT22	QT12, QT14, QT22	QT12
	Teacher interviews	Teacher E	Teacher F	Teacher B

Note. QT... = Questionnaire Teacher ...

With regard to the ethical use of information, there is evidence from student focus group discussions and teacher interviews that the educators who require students to document

sources in small-scale research tasks tend to be language teachers and that citation format is more important to language teachers than to math and science teachers. Student 2 reported in great detail about a language teacher who was seriously concerned with plagiarism:

> I know personally from one of my teachers there is, I think my [language XY] teacher, I think it was my freshman or sophomore year, somebody in another class that he had plagiarized on something and because of that my [language XY] teacher had kind of freaked out in a way, and he spent an entire class period just telling us all about how to cite for papers the right way ... And I could tell that he was a bit frantic because this plagiarism thing happened. And I feel like students in general know that it's easy to plagiarize on a computer, but I think with the teachers getting the way that my teacher had, it might psych them out a bit and make them feel a little too afraid. (Student 2, par. 150)

As shown in Table 4-16, seven out of the eight interviewed teachers who had assigned big research projects explained that their students had to document sources, but the only two out of the nine who had assigned small-scale projects and required their students to document sources were both language teachers.

Table 4-16: Ethical Use of Information by Subjects (Teacher Interviews)

Subject	**Teachers requiring students to document sources**		**Teachers perceiving citation format as important**	
	In extended research tasks	**In small-scale research tasks**	**Yes**	**No**
History	TH TI			
Languages	TA TK	TA TK	TA	
Math and Science	TB TC TF			TC TF

Note. T = Teacher

Another difference between subjects that occurred in interviews was the importance teachers gave to citation format. Teacher A, a language teacher, reported that his students learned how to use a specific format, MLA (Teacher A, par. 52), and emphasized the importance of its correct application, noting that "how they document their information is very important (Teacher A, par. 43; 52), whereas two math and science teachers (Teacher C, par. 110-111; Teacher F, par. 19) stated explicitly that format is less of a consideration to them. Teacher C explained:

> For me it's not that important. I mean, whether or not you write three words and then put the author's name and the date, or whether you write the author's name and the date in a second sentence. I mean, as long as it's there somewhere, for me it doesn't really matter. They are more particular about that. And so they want it- You have to have- It's within the first- I don't know, it's in the first sentence, after the first verb. I'm not sure exactly what it is, but there's particular rules for it. The way you cite certain things, the way- If it's a quotation, if it's more than a two-lines quotation then you make it into your own little paragraph, single space, it's like the quote becomes its own little part. These things to me are not that essential, for me. (Teacher C, par. 110-111)

For the following information literacy competencies evidence is either weak or contradictory. With regard to the engagement with information, evidence was only found in one teacher interview. A science teacher (Teacher C) reported about his students learning a particular subject-related reading strategy: keeping a list of acronyms (Teacher C, par. 66). Differences between subject groups for requiring students to go through extended research projects as a process composed of a number of steps were found in teacher questionnaires but not interviews (Table 4-17). All eight interviewed teachers who had assigned extended projects reported about their students going through various steps, whereas in questionnaires the six teachers who wrote about this information literacy aspect as being part of their research projects were language teachers (3/6) or history teachers (2/6); one teacher did not reveal his subject(s). The only teacher from the math and science group (QT20) who had students go through a process was also teaching history.

Table 4-17: Execution of Project as a Process by Subjects

Subject	**Source**	**Execution of project as a process**
History	Teacher questionnaires	QT17, QT20 (subject 1)
	Teacher interviews	Teacher H, I
Languages	Teacher questionnaires	QT7, QT19, QT25
	Teacher interviews	Teacher A, J, K
Math and Science	Teacher questionnaires	QT20 (subject2)
	Teacher interviews	Teacher B, C, F
No answer	Teacher questionnaires	QT02

Note. QT... = Questionnaire Teacher ...

For differences between subject groups regarding evaluation of information, the findings were also contradictory. Two of the four administrators (Administrator A, D) emphasized that history teachers frequently require students to evaluate information (Administrator A, par. 38-39, 44; Administrator D, par. 44).

Table 4-18: Evaluation of Information by Subjects

Subject	Source	Evaluation of information
History	Teacher questionnaires	QT17
	Teacher interviews	Teacher H
Languages	Teacher questionnaires	QT7, QT19, QT23
	Teacher interviews	Teacher A, D, J, K
Math and Science	Teacher questionnaires	QT3, QT12, QT18
	Teacher interviews	Teacher B, C, F

Note. QT... = Questionnaire Teacher ...

But in questionnaires (Table 4-18), the seven teachers who wrote about requiring students to evaluate sources in the research tasks they assign were mainly language teachers (3/7) or math and science teachers (3/7); only one of them was a history teacher. In interviews, only one of the two history teachers talked about evaluation of sources in the context of his research projects.

Summary for knowledge domains

The knowledge domain, or subject, in the context of which a research task is assigned, shapes the information literacy competencies involved. Strong support was found for information presentation in visual, electronic, and creative formats tending to be part of projects assigned by math and science as well as history teachers rather than those assigned by language teachers; from administrator interviews (external perspective) there was only evidence for visual formats, but from teacher questionnaires and interviews (internal perspective) there was evidence for all three. Also strong evidence was found for the following aspect: if the ethical use of information is part of small-scale research tasks, they tend to be assigned by language teachers, a finding supported by evidence from student and teacher interviews; the latter also revealed that citation format is important to language teachers but not to science teachers.

For the aspect of engagement with information in the category of knowledge building evidence was weak with an indication from only one interview with a science teacher that students learn subject-related reading strategies. For two other competencies the evidence was contradictory. As far as the evaluation of sources is concerned, the statement of two administrators that all history teachers require evaluation of information was not confirmed in teacher questionnaires and interviews. As far as the execution of a process is concerned, findings from teacher questionnaires, which indicated that the execution of a process is part of the projects that are assigned by language and history teachers rather than those assigned by math and science teachers, were not supported by findings from teacher interviews.

4.3.4 Summary for Competencies in Research Tasks

Expository teaching is an important teaching strategy at Malotha School, but the majority of faculty also requires students to engage actively with information. Whether educators teach information literacy or not depends partly on the type of class; it is less likely to happen in AP and particularly likely to happen in elective classes. The primary mechanisms for teaching information literacy are the assignment of small-scale and extended research tasks, with a predominance of the former.

The research tasks that Malotha teachers assign tend to especially cover the use of information technology, predominantly for the location and to a lesser extent for the presentation of information; the finding of information, predominantly school library sources closely followed by web sources; knowledge building, predominantly in the form of analysis in order to develop a personal perspective and evaluation of sources or evaluation of information within sources; the presentation of information, predominantly in written format; and, to a lesser degree, also the execution of a process and information control. To what extent the ethical use of information is part of research tasks could not be established because findings were contradictory.

The scope of research tasks shapes both the categories of information literacy as well as the information literacy competencies within categories that are covered in the research tasks that teachers have students undertake. As far as the first are concerned, ethical use of information and execution of the task as a process tend to be part of extended rather than small-scale projects. If control of information is addressed at all, it also tends to be part of extended tasks. As far as aspects within categories are concerned, for information finding it was found that school library sources and databases tend to be the predominant sources in extended projects

and web sources the prevailing in small-scale projects. It was also found - although the support was weaker for these two claims - within the category of knowledge building that engagement with information in the form of viewing tends to be part of small projects, and within the category of information presentation that oral formats tend also to be part of small-scale rather than extended projects. Findings for analysis of information in order to develop a personal perspective being shaped by the scope of research tasks were controversial.

The knowledge domain, or subject, in the context of which a research task is assigned, also shapes the information literacy competencies involved. Information presentation in visual, electronic, and creative formats tends to be part of projects assigned by math and science as well as history teachers rather than those assigned by language teachers. If the ethical use of information is part of small-scale research tasks at all, they tend to be assigned by language teachers; also, citation format is of higher importance to language than to science teachers. There was an indication, although it was weak, that students learn subject-related reading strategies. Findings were controversial for the claim that all history teachers require evaluation of information, and for the claim that execution of a process is part of projects assigned by language and history teachers rather than those assigned by math and science teachers. The next section reports findings for educators' pedagogical interventions.

4.4 Teachers' Pedagogical Interventions to IL Teaching

This section presents findings for the third research question about pedagogical interventions teachers use when they address information literacy, for which the following claims were developed:

Claim 6: When they teach information literacy, teachers provide pedagogical interventions at the whole-class and individual level.

Claim 7: Teachers' pedagogical interventions to information literacy teaching are shaped by the scope of the research task, the knowledge domain, and the type of class (intervening conditions).

The two claims are presented each in the form of a set of sub-claims. Wherever data were available from more than one source or collected with more than one technique, findings were compared or triangulated.

4.4.1 Providing Whole-Class Teaching and Individual Assistance

Claim 6: When they teach information literacy, teachers provide pedagogical interventions at the whole-class and the individual level.

For this claim the following sub-claims were developed:

- Sub-claim 6a: When they teach information literacy, teachers use a variety of strategies of whole-class teaching.
- Sub-claim 6b: When they teach information literacy, teachers use a variety of strategies of individual student assistance.

Interview participants were asked about educators' practices of information literacy teaching, which included pedagogical interventions (administrators: Theme 2 in Appendix 4; students: Theme 2 in Appendix 3; teachers: Theme 1 in Appendix 6). In questionnaires, teachers were not explicitly asked the exact same question (Appendix 10). However, in the answers they provided, nine out of the 21 teachers who had already assigned research tasks reported about providing instruction on the class level about information literacy (QT2, QT3, QT4, QT5, QT7, QT17, QT19, QT23, QT25) and six about providing individual assistance for students (QT2, QT3, QT7, QT9, QT17, QT26). In the next two subsections, first evidence for strategies of whole-class teaching will be presented followed by evidence for individual assistance.

4.4.1.1 Strategies for whole-class IL teaching

Sub-claim 6a: When they teach information literacy, teachers use a variety of strategies of whole-class teaching.

Participants referred to whole-class teaching when a teacher or librarian addressed issues with all students in a class or group setting. This section deals with whole-class teaching about information literacy offered by teachers. They used a variety of strategies, which are briefly described here in the way they emerged out of the data and in alphabetical order of the abbreviations in brackets:

Using analogies (A): Making comparisons for explaining a concept; for example, comparing the library to a bookstore, or comparing the development of a thesis in an essay to a wedding cake;

Discussions (D): Conversation between a teacher and the entire class; teacher asking questions to the class and giving students time to answer them;

Giving examples (E): Teacher showing particular types of ... (sources etc.);

Doing exercises (EX): Students practicing; focused training about information literacy competencies; using artificial topics;

Providing written handouts (H): Giving the class information in written format; forms for evaluation of sources; templates; prior to a research project or during; can be detailed or vague;

Doing lectures (L): Teaching lessons or explicit courses about particular information literacy concepts or competencies; talking to the class; transmitting information; instructing; tutorials; giving explanations; in oral format;

Modeling (M): Deliberate: Teacher using behavior, skills, etc. that he wants students to imitate; also occurs in unintentional ways;

Using prior skills (PS): Requiring students to use concepts or competencies they have developed prior to a specific task; in a previous grade or in the same grade; in the same class or in another one;

Doing it or making decisions for students (T): For a class or group of students as a whole; giving sources to them at the beginning of a project; evaluating sources for them; requiring them to use particular formats of sources or presentation; telling them not to use particular sources, for example, particular websites; giving them lists of topics;

Assessment strategies:

> *Summative assessment (SA)*: Assessing and grading the end product of a research task, for example, the final version of a paper;

Grading together with the librarian (GL): Both teacher and librarian grading the product; combining grades, for example, to an average grade, or not.

Strategies that could not be classified under any of these categories were grouped under "others" (*O*). Participants also reported about teachers'/their difficulties with (*CH*) and about not doing any teaching about particular concepts or competencies of information literacy (*No*). Table 4-19 shows what the various groups of study participants reported about teachers' use of these pedagogical strategies with whole-class teaching for the seven information literacy categories.

Teachers doing whole-class teaching on how to go through an extended research project as a process composed of a number of steps

Only teachers talked about the providence of whole-class teaching on the information process, doing so in questionnaires and interviews and only in the context of extended research tasks. Two teachers emphasized that they leave it to librarians to teach classes about this information literacy aspect. For example, Teacher I explained that he introduces his students to the project in his classroom, the project itself taking place in the library (Teacher I, par. 20) and a librarian introducing them to the different steps (Teacher I, par. 148). Four other educators teach classes about the process as such. Each time two teachers mentioned in questionnaires and interviews that they talk to their classes (*L*) explicitly about extended research projects being processes. For example, Teacher A explained that teachers introduce students to BRP10 as an extensive information process composed of a sequence of steps (Teacher A, par. 68). Two teachers reported that they gave students written handouts (*H*) with a detailed description of the steps at the beginning of the project. Again two teachers noted that BRP10 is based on prior skills (*PS*). Teacher K noted that the school's two scheduled research programs in grades 9 and 10 "build on one another and then for the next year we use lots of the skills in the prior year" (Teacher K, par. 43). Teacher A explained that teachers make students aware of the fact "by telling" them "to take that experience, expand upon it" (Teacher A, par. 41).

Table 4-19: Teachers' Strategies for Whole-Class Teaching in Research Projects

Persp	IL categories / Role	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
Ext	Admin		CH	T		L, EX		CH, GL, T
	Students			M, PS			L, O	GL?, T
Int (Q)	Teachers	L		L, L, T, ~~T~~		T, L, ~~T~~		T
Int (IS)	Teacher A	H, L, PS		E, L, M		L, T, D, M, T	L, CH, M	H, SA, T, T
	Teacher B	No	O, M	M		No, M		GL, SA, T, T
	Teacher C	L		L		L, T		CH, GL, SA, T
	Teacher D					T, O		T
	Teacher E		M	M		M, T		T
	Teacher F					CH, T		GL, SA, T
	Teacher G		CH	T		T		T
	Teacher H			M		M, O, T		M, SA, T, T
	Teacher I	No				T		GL, L, SA, T
	Teacher J	H		D, PS	L	A, D, EX, L, T, H		H, SA, O, T
	Teacher K	PS		O, CH, L, EX, A		D, E, T, A, L, EX	L, CH, L	T

Note. **Colors**: Blue = Strategies used for extended research tasks; Orange = Strategies used for small-scale research tasks; **Abbreviations**: Admin = Administrators (including the librarian); Persp = Perspective: Ext = External; Int = Internal; IS = Interviews; Q = Questionnaires; Strategies: A = Using analogies; CH = Experienced as challenging by teacher; D = Discussions; E = Giving examples; EX = Having students do exercises; GL = Grading together with a librarian; H = Written handouts; L = Lecture; M = Modeling; "No" was used when administrators or students/teachers stated explicitly that teachers/they did not do any whole-class teaching; O = Others; PS = Teaching based on prior skills; SA = Summative assessment; T = Teacher doing it or making decision for students; **Signs**: ? = Contradictions; ~~-~~ was used when a teacher explicitly mentioned that he did not use this particular strategy, e.g., ~~T~~

Teachers doing whole-class teaching on how to use information technology for information location and presentation

Administrators and teachers mentioned in interviews the providence of whole-class teaching by educators for the use of information technology. Two of the interviewed teachers act as models for their students for the use of information technology (*M*), one by regularly accessing websites in the class setting (Teacher E, par. 40-50) and the other one because he often makes use of presentation software in his teaching (Teacher B, par. 28). One teacher reported in general terms without specifying the strategy he used (*O*) about teaching the entire class about how to use online presentation software for BRP9 (Teacher B, par. 140). One administrator and one teacher noted that teaching the use of information technology to classes is particularly challenging for educators (*CH*).

Teachers doing whole-class teaching on how to find information in a variety of sources

Administrators, students, and teachers mentioned in interviews and teachers also reported in questionnaires that educators provide whole-class teaching about information finding. Three administrators, two teachers in questionnaires, and one teacher in an interview reported about educators searching sources for students (*T*). They stated, for example, "I ... give them sources to begin their search" (QT23, par. 10), and "I really do take a vested interest in maybe even providing them a large portion of the material" (Teacher G, par. 14).

Students and interviewed teachers mentioned modeling and the use of prior skills. Four interviewed teachers and one student talked about educators acting as models (*M*) for their students regarding the location of information. For example, Teacher H reported that in his extended research project he did a presentation before students presented their own findings; he acted as a model by searching the information for his own presentation in the school library when his students were working there (Teacher H, par. 82; 86). Two students and one teacher in an interview mentioned that educators require students to use skills they had developed earlier in new research tasks (*PS*). For example, Student 2 talked about a language teacher who required students to use databases for a shorter essay and the student noted "I feel like that's kind of taking the elements that you would have once only used for research papers, and bringing it into your class, so you're more used to it" (Student 2, par. 283). Teacher J reported that he requires students to transfer the research skills they developed in the school's scheduled extended research programs to smaller projects:

> So I try to incorporate this research in it, especially since this school in particular is big on the 9th grade research project, the 11th grade research, the 10th grade research project. It just feels so isolated to me that I think it's important that we bring research in for them. I don't want to say, "Here's something to read, read it, and that's what it is." I want them to go find it. (Teacher J, par. 60)

Three teachers in interviews and two in questionnaires noted that they teach lessons (*L*) about information finding. For example, Teacher A reported that he not only talks about different types of sources but also shows them to students and explains how they can be accessed:

> I talk about information coming from a variety of sources, the library being one of them, the computer being another, individuals another, film another. I guess, formally, I do it by actually ... demonstrating where this information is located, how to acquire this information. (Teacher A, par. 15)

Teacher C explained that he and the librarians "instruct" students to locate current information in databases in BRP11 (Teacher C, par. 56), and Teacher K explained that he gives his classes lessons on searching databases by inventing a topic; among others he does it in the classroom where he uses the projector for a lecture style of teaching (Teacher K, par. 61-62).

Only one teacher each mentioned the other strategies in interviews. Teacher K reported about using analogies (*A*), teaching students how to search the school library by comparing it to a bookshop and how to search the network of virtual libraries by comparing it to the physical library (Teacher K, par. 57-58). Teacher J reported about having discussions with his classes (*D*), preparing and evaluating the location of sources in the library in a class conversation (Teacher J, par. 20, par. 93). Teacher A gives students examples (*E*) of types of sources and explains how they can be used (Teacher A, par. 15). Teacher K reported about having students do exercises *(EX)* about searching sources in different types of formats: "I might set up a practice exercise, 'Okay, here's your topic, find this. Find me five different sources, one from a scholarly database, one from a popular magazine, one from a book, one from a-'" (Teacher K, par. 73). Teacher K also talked about another aspect (*O*) when he emphasized in the context of BRP10 that teachers address information location with their classes "early in the process" in order to prevent any problems (Teacher K, par. 71) and he reported that most difficult for him in his teaching about information location (*CH*) is understanding why students make mistakes in their papers although they were able to do it right in an exercise:

> Once you let them go with it, it's amazing what choices people make, do you know what I mean? It's a- And that's what it comes down to. We're not computers, we're human beings, and we make choices. And so the hardest part of the process of

> researching in information, as a teacher, is looking at the people who don't make the right choices and you don't know why. (Teacher K, par. 73)

Teachers doing whole-class teaching on how to control information

Only one study participant, one of the interviewed teachers, talked about educators addressing information control in the class setting. He talked about doing lectures (L), that is, "very specific instruction" about the portfolio he required students to keep (Teacher J, par. 35).

Teachers doing whole-class teaching on how to use the collected information in order to build new knowledge and extend existing knowledge

Administrators and teachers in interviews and teachers in questionnaires reported on educators doing whole-class teaching on aspects related to knowledge building. Two administrators, four teachers in interviews, and one teacher in a questionnaire reported about educators using a lecture-style of teaching (*L*). For example, Administrator C claimed that teachers "talk" to students about how to evaluate the results of a search engine and how to evaluate a free online encyclopedia (Administrator C, par. 23). For extraction of information, Teacher A has "a lesson" in which he teaches students "how to take notes, what ... the difference [is] between a quotation and a paraphrase and a summary" (Teacher A, par. 50). With regard to the engagement with information, Teacher C explained that he teaches his classes a subject-related reading strategy, keeping a list of acronyms (Teacher C, par. 66).

Teachers tend to be rather directive when it comes to knowledge building. Ten out of 11 teachers in interviews and one in a questionnaire reported about doing things for students or making decisions for them (*T*). Although the majority of them (6/10) mentioned student interest as the prime criterion of topic selection (Teacher C, par. 98; Teacher F, par. 19, par. 34; Teacher H, par. 18; Teacher I, par. 162; Teacher J, par. 26; Teacher K, par. 38, par. 39), they prepared lists of topics from which students were supposed to choose, including a list of topics that were part of the program and they had not had time to cover in class (Teacher B, par. 152; Teacher F, par. 47), or a list developed and expanded over time by a group of teachers (Teacher A, par. 29). However (~~*T*~~), one questionnaire participant emphasized that his small-scale projects "allow students flexibility in choosing their research topic" (QT5, par. 11). Teacher B explained with regard to topic selection in BRP11, that he did not know how students found their topics as he was not involved in that phase (*No*); it happened in the library when students were working with the school librarian (Teacher B, par. 50).

Teachers also reported about evaluating sources for students. Teacher 17 wrote: "students ... use ... internet; allow only .gov, .org, .edu, etc. not .com" (QT17, par. 8). Teacher D explained: "I sort of know what they are going to encounter because I do this often. So I tell them, 'Stay away from this website or stay away from that because that's not what we are looking for'" (Teacher D, par. 41). Teacher G sent his students towards websites that were pre-selected and recommended by universities or the teacher organization for that specific subject. He considered the "pre-screening" and the fact that the information on these sites is organized as extremely helpful and explained "maybe it's a little bit lazy but in some ways I think it's a way for me to even begin to attack all the information that's out there" (Teacher G, par. 14). Teacher J directed students towards databases he had selected and hence evaluated: **"**I gave them the databases to go to, I didn't just have them choose it on their own, I said, "You need to use certain databases" (Teacher J, par. 48). His aim was to make sure that his students used databases of high quality: "And so I wanted them to go to databases that I knew were scholarly and academic. And then within those, they had to find articles that pertained to their research" (Teacher J, par. 97).

Other strategies educators use are doing exercises (*EX*), which was reported by 2/11 teachers in interviews and 1/4 administrators; modeling *(M)* reported by 4/11 teachers in interviews, and discussions *(D),* used by three of the interviewed teachers. For example, Teacher A explained that he teaches evaluation of sources every week and has discussions with students about the different aspects involved:

> In terms of evaluating information, in any given week, there seems to be something in newspapers or magazines, sort of current events that I make them aware of. And we talk about the perspective of the source, whether it's a journalistic perspective or whether there's a more personal response. We talk about authorship and the author's credentials in a particular area to evaluate, the nature of that source, understanding that even that doesn't always present itself as a fool-proof way of knowing about a source. (Teacher A, par. 16)

All of the following strategies were reported by teachers in interviews only: using analogies *(A)* was reported by two teachers, for example, Teacher J explained that he teaches the development of a thesis by using the analogy of a wedding cake (Teacher J, par. 35-40); giving examples (*E*), by one teacher; written handouts (*H*), by one teacher, for example, having students complete a written form for the evaluation of web sources (Teacher J, par. 18); or others (*O*), like giving students an oral "skeleton" for the evaluation of web sources, or telling students prior to a short research task, "Always ask the basic questions: What is it? What year? Why?" (Teacher D, par. 41), or giving students enough class time to engage with

the information they collected. Teacher H provided students with as much time as he thought they would need to analyze the information in order to develop a personal point of view:

> The reason I gave them a month is that I knew it would take a long time for them to really understand the bigger picture and take in a lot of different information, probably from varying view points, in order to formulate their own opinion. (Teacher H, par. 48)

For one teacher the most difficult aspect (*CH*) in his extended project was teaching students how to select "pertinent, important" information and how to evaluate online information for reliability and validity (Teacher F, par. 25).

Teachers doing whole-class teaching on how to use information ethically

Students and two teachers reported in interviews about whole-class teaching for the ethical use of information provided by educators. The two teachers and one of the students reported about the strategy of lecturing (*L*). The student gave the example of a language teacher who taught his class about citing sources because there had been problems with plagiarism in another class: "He spent an entire class period just telling us all about how to cite for papers the right way. Like what not to do, what to do in situations where sources might be a little sketchy" (Student 2, par. 150). Teacher A talks to students about the importance of documenting sources and teaches a specific format (Teacher A, par. 52). Both teachers experience the teaching of the ethical use of information as challenging (*CH*). Teacher A explained that teaching citation format is difficult in a regular class whereas it is not with honor students (Teacher A, par. 52). Teacher K reported that he experiences teaching students to credit sources as "very difficult", as a "maddening process" and as tiring (Teacher K, par. 64-69). He stated that he talks about it daily in his classes and that he experiences some kind of frustration when students still plagiarize:

> And if I paint it in those terms, which I do almost every day, and this is why teachers get frustrated or just go spin around in circles, if I say that very clearly and then a student writes a sentence which is clearly from a source of information. ... And so these are the battles that we kind of fight in school about information exchange." (Teacher K, par. 70)

Teacher A emphasized that he models (*M*) the documentation of the sources in his everyday teaching:

> But I think if you can put it into a context about why that is important to what you produce, and if they see that, and if I am modeling that, in other words, if they understand that I too have to tell them where I get my information. It's not as if this is I'm a fountain of intellect here. I mean, I get my information from sources, and I have

> to let them know where I get my information as well. So, if they see that there's a relationship between what I do in the classroom and what I'm asking them to do here, that tends to have a little greater impact. (Teacher A, par. 52)

Four students talked about teachers who had used software to discover plagiarism (O).

Teachers doing whole-class teaching on how to present information

There is evidence from administrators and students (external perspective) and teacher questionnaires and interviews (internal perspective) about Malotha educators performing whole-class teaching on the presentation of information. With regard to the strategies they use, the findings indicate that teachers tend to require particular formats of presentation rather then letting students decide (*T*); there is evidence from 11/11 interviewed teachers, 2/6 students, 1/4 administrators, and 1/21 teachers in a questionnaire. For example, Teacher H described his role as "deciding on the format of how they would be presenting in the groups, how much time they needed to spend doing certain activities that I set up for them" (Teacher H, par. 82). However, one teacher reported about a small-scale project where he gave students the choice to present information either in a "long paper" or "they could write a short paper like two or three pages and then do something creative as well" (Teacher B, par. 152).

Teachers also assess and grade end products (*SA*): in interviews, seven out of the eight teachers who assigned extended research projects reported about assessing and grading end products, among them were the four teachers who were involved in BRP11 and who reported about assessing and grading end products together with the school librarian (*GL*). Teachers' involvement in the assessment and grading procedure in BRP11 was confirmed by two administrators and one student but contradicted by two other students who clearly stated that they were not sure if their teachers graded the final paper or not (*GL?*). When they collaborate with librarians, teachers grade the final version of the paper for subject content (Teacher B, par. 68; Teacher C, par, 106; Teacher F, par. 43; Teacher I, par. 56). Two teachers also explained how they combine the teacher's and the librarian's grades. Teacher F noted that students get an average grade (Teacher F, par. 43-45). Teacher I also said that the "grades are combined" but emphasized that "it's not an exact science" and added that the teacher and librarian also "give a combined effort grade", which is the decisive one (Teacher I, par. 58). One administrator and a teacher noted that reading the final papers in BRP11 is extremely time-consuming (*CH*). Other strategies of whole-class teaching were only reported by teachers in interviews. Two teachers talked about giving students detailed written explanations

about their expectations regarding end products in extended projects (*H*). Each time one teacher talked about lecturing *(L)* and modeling *(M)* or using other strategies (O).

Summary for teachers' whole-class teaching of information literacy

For addressing information literacy, Malotha teachers used a variety of strategies for whole-class teaching. With regard to the information literacy categories covered, best supported is teachers addressing information presentation with the class as a whole, there is evidence from administrators and students (external perspective) as well as teachers in questionnaires and all eleven in interviews (internal perspective). Teachers doing whole-class teaching about knowledge building (with evidence from administrators, teachers in questionnaires, and all teachers in interviews) and information finding (with evidence from administrators, students, teachers in questionnaires and 8/11 in interviews) are also well supported by the data. Whole-class teaching provided by educators was less often mentioned by study participants for the ethical use of information (students and 2/11 teachers in interviews), the use of information technology (2/11 teachers in interviews), and information control (1/11 teachers in interviews). Findings for information process were contradictory. In addition to questionnaire participants, four interviewed teachers reported about teaching their classes to go through an extended research project as a process composed of sequences of steps whereas two teachers explicitly stated that they do not address the issue, leaving it to a librarian. As far as the assessment of end products is concerned, teachers assess and grade end products in extended research tasks if they work alone, but if the school librarian is involved in the grading procedure, there seem to be teachers who do not participate at all in the grading, a behavior not appreciated by students.

4.4.1.2 Strategies for individual assistance in IL teaching

Sub-claim 6b: When they teach information literacy, teachers use a variety of strategies of individual student assistance.

Study participants reported less about teachers' use of strategies for individual guidance than strategies of whole-class teaching. However, again teachers employ a variety of strategies for providing individual assistance for student information literacy learning. The following were mentioned by study participants and they are briefly described in the way they emerged out of the data:

Answering student questions (AN): Teacher being available for answering questions individual students may have during the completion of a research task;

Asking students questions (Q): Teacher asking a student particular questions in order to enhance his thinking, make him move forward or in another direction;

Providing written handouts (H): Giving class information in written format that allows students to reflect on the research process on an individual level, help to enhance formative assessment;

Reading (R): Teacher reading what a student wrote, for example summaries, rough drafts;

Making suggestions and comments (S): Teacher offering alternative options to a student; in oral or written form;

Doing it for students or making decision for them (T): For an individual student; teacher searching sources for him; evaluating sources for him; telling him not to use particular sources;

Participants mentioned the following *assessment strategy*: *Formative assessment (FA):* Assisting students on an individual level; assessing intermediate products; aim: give students the possibility to improve; with scores/grades or without.

Strategies that could not be classified under one of those categories were grouped under "others" (*O*). Participants also reported that teachers/they had difficulties with (*CH*) or did not provide any individual assistance (*No*) for particular information literacy concepts or competencies. Table 4-20 shows what the various groups of study participants reported about educators' use of these pedagogical strategies of individual assistance for the seven information literacy categories.

Table 4-20: Teachers' Strategies for Individual Assistance in Research Projects

Persp	IL categories / Role	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
Ext	Admin					O, O		
	Students	No		No		S, O		
Int (Q)	Teachers	FA, FA		O		T		
Int (IS)	Teacher A	CH, FA, H		O, Q, AN		O, Q, S, T, R	R, S	R, S
	Teacher B	No		O, S				
	Teacher C	FA		No		O, Q, R, S, T	R, S	
	Teacher D							
	Teacher E			S				
	Teacher F	FA/ No				T		
	Teacher G							
	Teacher H	FA		Q, ~~T~~		CH,T, ~~T~~, O		CH, ~~T~~
	Teacher I	FA		O		CH, O, S	No	O
	Teacher J	FA, H		AN, O, T	O	CH, Q, R, S		R, S
	Teacher K	FA		O			O	

Note. **Colors**: Blue = Strategies used for extended research tasks; Orange = Strategies used for small-scale research tasks; **Abbreviations**: Admin = Administrators (including the librarian); Persp = Perspective; Ext = External; Int = Internal; IS = Interviews; Q = Questionnaires; Strategies: AN = Answering student questions; CH = Experienced as challenging by teacher; FA = Formative assessment; H = Written handouts; "No" was used when administrators or students/teachers stated explicitly that teachers/they did not do any individual guidance; O = Others; Q = Asking questions; R = Reading; S = Making suggestions and comments; T = Teacher doing it or making decision for students; **Sign**: - was used when a teacher explicitly mentioned that he did not use this particular strategy, e.g., ~~T~~

Teachers assisting students individually with the process as such

Teachers, in questionnaires and interviews, and students addressed the providence of individual assistance by educators for the research process as such, which is referred to here as formative assessment (*FA*), but findings are contradictory. Speaking in general terms, 7/11 teachers in interviews and 2/21 in questionnaires reported about individually guiding students through extended research projects. For example, Teacher A said that in BRP10 all teachers "are very involved with each student" and "look at all of their materials" (Teacher A, par. 43). Teacher F explained for the big project which he did without any librarian that after an introductory session for the whole class, "I'll come around and I'll be checking on them" (Teacher F, par. 27). Teacher J emphasized that he closely supervises each single student:

> I can sit down with a student one-on-one in an entire class setting as everyone is working on their work and be able to have that conversation with them and move to the next student and be able to go through all of them within a class period. (Teacher J, par. 64)

Teacher H repeatedly emphasized the role of student independence (Teacher H, par. 44). He explained that he gave his students "leeway and evaluation" (Teacher H, par. 50) without interfering much. He described his role as that of a guide who makes sure that students are moving in the right direction and readily answers their questions but his overall attitude was to let students make the decisions:

> I just, in a project like that, just wanted to be another resource, for the students to be able to ask questions or to be able, in some cases, to just take a look at what they are doing. And help them, give them a little bit of guidance in which way they should take it, if they had questions about that. But, really, I just wanted to stay kind of in the background as a role and let it be very student-driven. (Teacher H, par. 82)

Teacher I noted that he helped those students who did not understand a lesson that the librarian had taught in BRP11 (Teacher I, par. 42) but he does not feel able to do it in all stages (Teacher I, par.54). However, in the context of BRP11, other study participants reported about educators leaving student assistance completely to a librarian. Two students said that the project took place in the library and teachers did not help them at all: Student 3 noted, "It's basically a free for them [teachers], because they're not really doing anything" (Student 3, par. 253). In interviews, two teachers (Teacher B and F) said that they did not get involved in helping students with the process, for example, Teacher F noted:

> Actually, I took them to the library. We'd have specific days, the librarians would be expecting us, and I would drop my students off, and the librarians would then work with

> them during that period. My part came in when the projects were completed, in the evaluation of the term paper that they produce. (Teacher F, par. 43)

Teachers used different approaches of formative assessment. Two of them noted that they did it by formally grading intermediate products (Teacher A, par. 55-68; Teacher J, par. 35). Teacher H gives students feedback throughout the research process without giving them any grades. He emphasized that he wants to make sure that students take the risk to try out things and feel okay making mistakes:

> I know, in some cases, if it's like paper writing, you grade like a rough draft or a second draft and then a final draft. But I rather just give them feedback on what they're doing and take the emphasis off on kind of what grade they're getting or how they are being evaluated. I guess, I [... tape unclear] emphasize the grades across-the-board, in my classes, even in the AP class where the results count and the results matter. I try to build their confidence just by giving them, I guess, 'It's okay, this stuff is hard, it's okay to fail, but you have to go back and do it a little bit better the next time.' Not have the black mark of a bad grade holding them down, and [... tape unclear] reason it's given them a lot of confidence to move forward, across-the-board, in all of my classes, it seems to work and to really judge them on the final product. (Teacher H, par. 50)

Other strategies teachers used for assisting students on an individual level with the process as such included written handouts (*H*) (2/11 teachers in interviews) given to students at the beginning of their extended research projects and containing detailed information about expectations and the grading procedures regarding intermediate products (Teacher A, par. 56-58; Teacher J, par. 35). Teacher A referred to formative assessment and especially the time needed to read the intermediate products as the most difficult aspect (*CH*) for him in his extended research project (Teacher A, par. 52).

Teachers assisting students individually when they are searching for information in a variety of sources

The evidence for teachers helping students individually with the location of information is contradictory. The majority of interviewed teachers (7/11 participants) and one teacher in a questionnaire reported about helping students with this information literacy aspect. However, in the context of BRP11 one teacher explicitly noted that he did not feel able to help students with searching databases (Teacher C, par. 87), a finding supported by a student who explained that teachers did not help with searching for information "because they don't really know how to look up the stuff" (Student 3, par. 253).

The seven teachers reported helping students by means of the following strategies: Answering student questions (*AN*) (2/11 teachers), for example, Teacher J noted: "I'm running around from student to student. They're asking questions ..." (Teacher J, par. 93); asking the student questions (*Q*) (2/11 teachers), for example, one teacher explained: "All I had to do was ask him some of those questions, and then he began to look for that kind of information" (Teacher A, par. 101); making suggestions and comments (*S*) (2/11 teachers), for example, Teacher B reported about helping his students with formulating better interview questions in a small research project by making comments, noting:

> They came back to me with answers that were just basic answers, and I told them, "There has to be more in-depth- You need to find out more specific information." They went away, they reworded their questions and they improved it, they got it. (Teacher B, par. 22)

In interviews, one teacher noted that he searched sources for individual students (*T*), explaining: "I would look up some books for them and put them in their direction" (Teacher J, par. 92), whereas another one emphasized that he wanted his extended research project to be "student driven" mainly and noted "I stayed out of telling them which way to go with their projects or shaping their research, I let them do it independently" (Teacher H, par. 44, 82)

Five teachers in interviews and one in a questionnaire used other strategies *(O)* for helping students with information finding. For example, one of them went with a small group of students during class time to a museum that was relevant for their topic (Teacher A, par. 44) while another one emphasized that helping students with searching databases in BRP11 is easy for him:

> They might not even know how to search a database and know how to access [the required type of] articles. It could be as simple as just telling them on [name of database], "You've got to click on this box," something as simple as that. (Teacher I, par. 44)

Writing in general terms, the questionnaire participant noted that he has assigned "small-scale activities where students have guidance in investigating resources that they may not be familiar with" (QT9, par. 10).

Teachers assisting students individually when they are controlling information

Only one teacher and he did so in an interview, reported about helping students on an individual level with information control. Teacher J emphasized that during the location phase

in the library, he "would make sure" that students kept all the information they had found so that it was available to them any time (Teacher J, par. 92).

Teachers assisting students individually when they are using the information they located in order to build new knowledge and extend their existing knowledge

There is evidence from all groups of study participants that educators help students on an individual level with constructing knowledge from the information they collected. Talking in general terms without specifying the strategy used (*O*), two administrators, one student, and 4/11 teachers mentioned that educators help students on an individual level with topic selection and evaluation of sources. For example, Teacher I noted about BRP11: "The first thing I get involved is the kids are given a day or two to choose their topic. And I'd go around the library" (Teacher I, par. 26). He emphasized that helping students with topic selection was easy for him (Teacher I, par. 55). In the context of the same project, Student 6 explained that his teacher helped him "a lot more" than the librarian, not only with topic selection but also with focus formulation: "But I did talk a lot more with my teacher about choosing my topic and really focusing my topic towards something that I could get more information on" (Student 6, par. 353).

As far as particular strategies are concerned, making suggestions and comments *(S)* was mentioned by 4/11 teachers in interviews, one teacher in a questionnaire, and one student. Teachers use it when they help students with topic selection or focus formulation, for example, Teacher I explained:

> Because they go from their broad topic, you suggest a narrower topic, they start researching the narrower focus and they're like, "That sounds pretty cool." So, you make a suggestion, the kids research, and then realize that's the road they want to travel with their research paper. (Teacher I, par. 34)

They also use it in order to help students with note taking (Teacher A, par. 43).

Again 4/11 teachers in interviews and one in a questionnaire reported about doing something for a student or making a decision for him (*T*), for example, they evaluated sources for individual students; Teacher F said:

> I tend to be more individual at that point, like, "Mary, I noticed you quoted Wikipedia," or "You quoted this site, don't you think you should go back and look and check maybe some more authoritative sites? (Teacher F, par. 27)

Teacher 3 wrote: “I use the knowledge I have to help them determine the validity of the information for their projects - I check it myself if I am not sure” (QT3, par. 11). Teacher H emphasized that he tried not to push students in one direction or another; he noted that he “let them explore the topics on their own and decide for themselves what would be most appropriate to do” (Teacher H, par. 82). However, on need, he evaluated sources for his students and “told them if it was a legitimate source or not” (Teacher H, par. 44).

Educators also used the strategy of asking students questions *(Q)* (3/11 teachers in interviews). For example, Teacher A guided a student from simply reporting the information he collected towards building an understanding from it by asking him questions (Teacher A, par. 101-102). Teacher J also used the strategy of asking questions in order to help students move towards a deeper level of thinking:

> I would maybe say, “This is very interesting what you're talking about your [topic] here, did you ever think it can make this connection to this [aspect]?” And then they would take that and keep going with it and keep researching on that specific train of thought, those kind of the idea in mind. (Teacher J, par. 24)

Teachers (3/11) also reported about reading *(R),* for example, student notes (Teacher A, 43), or summaries. Teacher C explained that one way to make sure that his students “keep on track” is reading their summaries of the collected information; he emphasized that it is skimming rather than in-depth reading (Teacher C, par. 104, 106).

Three teachers said that helping students build knowledge from the sources they located was *(CH)* challenging. Teacher I noted that helping students with reading and summarizing the texts is difficult for him and he often asks a librarian to assist the student (Teacher I, par. 55). Difficult for Teacher J was helping students to use the information they collected in order “to enhance [their] ideas and [their] understanding and [their] arguments and perspective and analysis” (Teacher J, par. 50). Challenging for Teacher H was “trusting” students that they would become knowledgeable enough for presenting their findings to the external audience (Teacher H, par. 34).

Teachers assisting students individually with ethical use of information

Only teachers, and only in interviews, talked about helping students with the ethical use of information on an individual level, but the findings are contradictory: while one teacher stated that he is not able to help students *(No)* with this information literacy aspect, three other teachers reported about providing guidance. They used the strategies of reading (*R*) and

making suggestions and comments *(S)* (2/11 teachers); for example, Teacher C reads a student's summaries in more depth when there are hints that he plagiarized:

> The only time when I start reading their actual paper, I mean not only the back of the front, is if there might be plagiarism. [... tape unclear] say, "It doesn't sound like your writing at all, it sounds like some scientist wrote that." So, I'll go look at the article and say, "Yeah, look, here it is, word for word, what you just wrote over there and now put in your paper, so that's not right." (Teacher C, par. 106)

And Teacher K has "arguments" *(O)* with his students about documenting sources: "The students tend to have an internal argument, besides the external one they have with me ... over who owns information" (Teacher K, par. 44).

Teachers assisting students individually when they are presenting information

Only teachers in interviews stated that they provide individual help for information presentation. They use the strategies of reading (*R*) and making suggestions and comments *(S)* (each time 2/11 teachers). Teacher A and Teacher J explained that they help students with writing by reading their rough drafts and making suggestions for changes (Teacher A, par. 52; Teacher J, par. 33). One teacher did not specify the strategy *(O*) but explained that he helps students with their writing with form, that is, "sentence structure, anything" (Teacher I, par. 50) and another one emphasized that he "let them ... decide for themselves ... what would be most appropriate to present" (Teacher H, par. 82) *(T)*. Because he required students to present their findings to an external audience, Teacher H stated that one difficulty for him in his extended research project was "trusting" students to do good presentations (Teacher H, par. 34). *(CH)*

Summary for individual assistance provided by teachers regarding information literacy

Although it was reported by study participants less often than whole-class teaching, Malotha educators employ a variety of strategies for providing individual assistance about information literacy. Best supported is teachers helping students individually with knowledge construction (with evidence from administrators, students, teachers in questionnaires, and 6/11 teachers in interviews). The evidence for teachers providing assistance to students with the step-by-step information process, the location of information, and the ethical use of information are contradictory. For the information process, teachers in questionnaires and 7/11 teachers in interviews reported about using formative assessment in extended projects, whereas students and 2/11 interviewed teachers reported about educators not doing so. As far as information

finding is concerned, the majority of teachers do help students with this aspect (there is evidence from teachers in questionnaires and 7/11 teachers in interviews) but there are teachers who do not feel able to and leave it to a librarian (students and 1/11 teachers). Evidence about teachers helping students on an individual level with ethical use of information was also contradictory. It was found only in teacher interviews, and 3/11 participants said that they helped students on an individual level with this information literacy aspect whereas one emphasized that he could not do so. Less well supported, they were mentioned by teachers in interviews only, are individual guidance provided by educators for information presentation (4/11 teachers) and control (1/11 teachers). Individual assistance for the use of information technology was not mentioned at all.

In the next subsections the intervening conditions that shape teachers' pedagogical strategies are described.

4.4.2 Intervening Conditions

Claim 7: Teachers' pedagogical interventions to information literacy teaching are shaped by the scope of the research task and the knowledge domain.

This claim states that there are factors that influence the type of interventions teachers use when they teach information literacy; they are expressed in the following sub-claims:

- Sub-claim 7a: The scope of the research task shapes pedagogical interventions to information literacy teaching.
- Sub-claim 7b: The knowledge domain shapes pedagogical interventions to information literacy teaching.

From pilot data analysis, another sub-claim about the length of teaching experience shaping pedagogical interventions to information literacy teaching was developed. At Malotha not enough evidence to maintain that claim could be found.

4.4.2.1 The scope of the research task

Sub-claim 7a: The scope of the research task shapes pedagogical interventions to information literacy teaching.

Findings indicate that a teacher's decision to provide whole-class instruction or individual assistance about information literacy depends partly on the scope of the research task, extended or small-scale. Four tables support this sub-claim: All strategies of whole-class teaching which a participant (teacher interviews) or at least one member of a group of participants (administrators, students, and teacher questionnaires) mentioned were summarized under "C", all strategies for individual assistance under "I". Two tables summarize the strategies teachers used in the context of extended research tasks; those for whole-class teaching are presented in Table 4-21 and those for individual guidance in Table 4-23. In interviews, eight out of the 11 teachers talked about this type of task. The two other tables are summaries of the strategies teachers use when their students undertake small-scale research tasks; Table 4-22 offers an overview of strategies for whole-class teaching and Table 4-24 of those for individual guidance. In interviews, nine teachers talked about assigning this type of research tasks.

Taking all information literacy categories together, individual assistance was reported more often for extended research tasks (Table 4-23) than small-scale (Table 4-24). In interviews, 7/8 teachers who had assigned extended research tasks reported about guiding students individually, whereas only 3/9 of those who had assigned small-scale tasks had provided individual assistance. In the context of extended tasks they reported it for six out of the seven information literacy categories and in the context of small-scale tasks only for one. However, the finding is only weakly supported by evidence from students who did not talk about individual assistance for small-scale tasks and only for one information literacy category in extended tasks. It is not supported by administrators who mentioned individual guidance for both types of tasks and each time for knowledge building only. And it is slightly contradicted by teacher questionnaires, where individual guidance was reported for only one information literacy category in extended projects but for three information literacy categories in small-scale projects.

Table 4-21: Teachers' Use of Whole-Class Teaching Strategies in Extended Research Projects (Summary)

Persp	IL categories / Role	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
Ext	Admin							C + CH
	Students							C
Int (Q)	Teachers	C		C		C		
Int (IS)	Teacher A	C				C	C + CH	C
	Teacher B	No	C			C: No		C
	Teacher C	C		C		C		C + CH
	Teacher F					C + CH		C
	Teacher H			C		C		C
	Teacher I	No				C		C
	Teacher J	C		C	C	C		C
	Teacher K	C		C		C	C	C

Note. **Abbreviations**: Admin = Administrators (including the librarian); Persp = Perspective; Ext = External; Int = Internal; IS = Interviews; Q = Questionnaires; C = Teaching the whole-class; CH = Experienced as challenging by teacher; "No" was used when administrators or students/teachers stated explicitly that teachers/they did not do any teaching about this IL category; **Signs**: "+" was used when administrators or students/teachers mentioned at least one strategy that teachers/they used in addition to talking about difficulties;

Table 4-22: Teachers' Use of Whole-Class Teaching Strategies in Small-Scale Research Projects (Summary)

Persp	IL categories / Role	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
Ext	Admin		C: CH	C		C		C
	Students			C			C	C
Int (Q)	Teachers			C		C		C
Int (IS)	Teacher A			C		C	C	C
	Teacher B		C	C		C		C
	Teacher D					C		C
	Teacher E		C	C		C		C
	Teacher F							
	Teacher G		C: CH	C		C		C
	Teacher H							C
	Teacher J			C		C		
	Teacher K			C + CH		C	C + CH	

Note. For explanations see Table 4-21 above.

Table 4-23: Teachers' Use of Strategies for Individual Assistance in Extended Research Projects (Summary)

Persp	IL categories / Role	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
Ext	Admin					I		
	Students	I: No		I: No		I		
Int (Q)	Teachers	I						
Int (IS)	Teacher A	I + CH		I		I	I	I
	Teacher B	I: No						
	Teacher C	I		I: No		I	I	
	Teacher F	I/No				I		
	Teacher H	I		I		I + CH		I: CH
	Teacher I	I		I		I + CH	I: No	I
	Teacher J	I		I	I	I + CH		I
	Teacher K	I					I	

Note. **Abbreviations:** Admin = Administrators (including the librarian); Persp = Perspective; Ext = External; Int = Internal; IS = Interviews; Q = Questionnaires; C = Teaching the whole class; CH = Experienced as challenging by teacher; I = Guiding students individually; "No" was used when administrators or students/teachers stated explicitly that teachers/they did not do any teaching about this IL category; **Signs:** "+" was used when administrators or students/teachers mentioned at least one strategy that teachers/they used in addition to talking about difficulties; / : was used in order to distinguish between two extended projects which the same teacher assigned

Table 4-24: Teachers' Use of Strategies for Individual Assistance in Small-Scale Research Projects (Summary)

Persp	IL categories / Role	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
Ext	Admin					I		
	Students							
Int (Q)	Teachers	I		I		I		
Int (IS)	Teacher A							
	Teacher B			I				
	Teacher D							
	Teacher E			I				
	Teacher F							
	Teacher G							
	Teacher H							
	Teacher J							
	Teacher K			I				

Note. For explanations see Table 4-23 above.

Depending on the scope of research task, teachers address different information literacy categories in whole-class teaching. A comparison of Table 4-21 and Table 4-22 shows that teachers teach their classes about the research process as such only in extended research projects, even if not all of them do so. Teachers in questionnaires and 4/8 in interviews reported addressing the information literacy process with classes in extended projects and no study participant mentioned it for small-scale projects. Educators tend to do more whole-class teaching for information finding in small-scale research tasks: 6/9 teachers who assigned this type of research task reported about doing so whereas 4/8 said they did so in extended projects, and administrators and students only reported about it in the context of small-scale projects.

The information literacy categories for which teachers provide individual assistance also vary according to the scope of research tasks. A comparison of Table 4-23 and Table 4-24 shows that if they provided it at all in the context of small research tasks, teachers do it for information finding. Teachers reported about doing so in questionnaires and in interviews, where 3/9 who had assigned this type of research task mentioned individual help only for this particular information literacy category; the finding is not supported by teachers in questionnaires, who mentioned individual guidance for two other information literacy categories as well. But individual student assistance for extended research tasks is provided predominantly for building knowledge from the collected information, a finding supported by evidence from interviews with administrators and students and from 6/8 interviewed teachers who assigned this type of research tasks. For the predominance of individual assistance for the information process in extended research tasks the data are contradictory: it is supported by evidence from 7/8 teachers in interviews, but contradicted by one teacher in a questionnaire, who mentioned formative assessment in the context of small projects.

In brief, findings indicate that a teacher's decision to provide whole-class instruction or individual assistance partly depends on the scope of the research task. The next subsection presents findings for knowledge domains shaping pedagogical strategies.

4.4.2.2 The knowledge domain

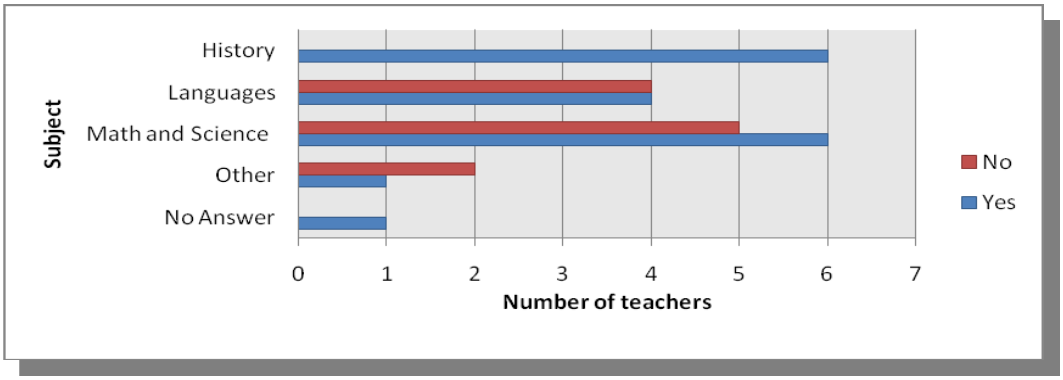
Sub-claim 7b: The knowledge domain shapes pedagogical interventions to information literacy teaching.

Several differences between subjects regarding information literacy teaching were identified. For the external perspective, only evidence from interviews with administrators is available; for the internal perspective, there is evidence from teacher questionnaires and teacher interviews.

Among administrators there was unanimity that there are differences in information literacy teaching at Malotha School depending on departments. In general terms, 2/4 administrators claimed that math teachers are less likely to address information literacy in their courses than teachers from other departments (Administrator B, par. 14; Administrator C, par. 29). In order to protect the anonymity of interview participants within the school, it was decided to present findings for math teachers together with those for science teachers. Therefore, it is not possible to provide any further evidence that could support or question this part of the claim. Only three subject groups were distinguished: history, language, as well as math and science. Three of the four administrators also claimed that research projects at their school, regardless of the scope, differ depending on the department in which they are assigned (Administrator C, par. 29; Administrator A, par. 35). For example, Administrator D described the extended project that is assigned by language teachers in grade 10, the science project in grade 11, and small research tasks in the history department, and noted: "So there are three different examples of, I think, how the teachers might go about the same work but in very different ways" (Administrator D, par. 37-39; 44-45). Administrator C also stated that the teaching of evaluation of web sources happens "subject specific" (Administrator C, par. 21).

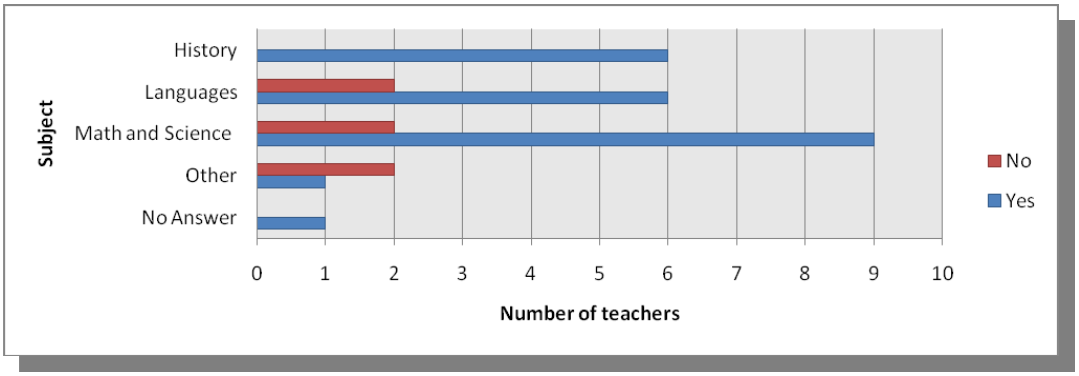
From questionnaires, data were available only about the assignment of research tasks in general. Repartition of the individual participants among the subject groups was shown in Table 3-2. Twenty-one out of the 26 teachers (80.77%) reported about assigning research tasks, extended or small-scale or both. Figure 4-4 and Figure 4-5 show the assignment of the two types of research tasks by subjects.

Figure 4-4: Assignment of Extended Research Tasks by Subjects (Questionnaires)



Note. N=29

Figure 4-5: Assignment of Small-Scale Research Tasks by Subjects (Questionnaires)



Note. N=29

The most significant finding is that all history teachers assign both types of research tasks, whereas within the other two departments there is variety: Six out of the eight language teachers assign small-scale and half of them extended research tasks; 9/11 math and science teachers assign small-scale research tasks and slightly more than half of them (6/11) also extended research tasks.

The analysis of teacher interviews revealed differences between departments in their use of whole-class teaching and individual student guidance (Table 4-25). Repartition of interviewed teachers among subject groups was shown in Table 3-5. Science teachers are more likely to do whole-class teaching on the use of information technology. Teachers did not report much about teaching students how to use information technology for information location or presentation; the two teachers who did so were math and science teachers, whereas one of the language teachers described teaching students about this information literacy category as particularly challenging.

Table 4-25: Teachers' Use of Strategies for Whole-Class Teaching and Individual Assistance in Research Projects by Subjects (Summary)

Subject	IL categories / Teacher	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
History	Teacher H	I		C, I		C, I + CH		C, C I: CH
	Teacher I	C: No, I		I		C, I + CH	I: No	C, I
Language	Teacher A	C, I + CH		I C		C, I C	C + CH I, C	C, I C
	Teacher D					C		C
	Teacher G		C: CH	C		C		C
	Teacher J	C, I		C, I C	C , I	C, C I + CH		C, I
	Teacher K	C, I		C, I C + CH		C C	C, I C + CH	C
Math and science	Teacher B	C: No I: No	C C	C, I		C: No C		C C
	Teacher C	C, I		C I: No		C, I	I	C + CH
	Teacher E		C	C, I		C		C
	Teacher F	I/I: No				C + CH I		C

Note. **Colors**: Blue = Extended research tasks; Orange = Small-scale research tasks; **Abbreviations:** C = Teaching the whole class; CH = Experienced as challenging by teacher; I = Guiding students individually; "No" was used when administrators or students/teachers stated explicitly that teachers/they did not do any teaching about this information literacy category; **Signs:** "+" was used when administrators or students/teachers mentioned at least one strategy that teachers/they used in addition to talking about difficulties; "/" was used in order to distinguish between two extended projects which the same teacher assigned

Language teachers are more likely to teach students about the ethical use of information. When they talked about their extended research projects, two of the three language teachers reported about teaching it to the class as a whole and also about helping students individually. One of the history teachers emphasized that he was not able to help students with that aspect, whereas the sole science teacher who did so, checked if students plagiarized or not but did not help them with the techniques of doing citations. When they talked about small-scale research

tasks, only language teachers, although only two out of the five, mentioned that they teach classes about the documentation of sources.

When students undertake extended research tasks, history and language teachers are more likely to provide individual assistance for information finding. Two of the three language teachers and the two history teachers who talked about this type of research project stated that they help their students individually; one of the history teachers even noted that it is easy for him (Teacher I, par. 44). None of the science teachers reported about providing individual guidance for this aspect of information literacy; instead, one of them emphasized that he did not feel able to do so.

When students undertake extended research tasks, language teachers are more likely to provide instruction at the class level about the research process as such. All three language teachers who assigned extended research projects reported about teaching their classes as a whole how to go through the project as a process composed of a sequence of steps whereas a history and a science teacher explained that they did not do so, leaving it to a librarian. Findings are contradictory for language and history teachers being more likely to guide students individually through the steps of extended research processes. All three language teachers who assigned this type of project and the two history teachers reported about doing so but findings from science teachers are controversial: one provided individual student assistance, one teacher did so in one project but not in the other one, and the third teacher who assigned extended projects, said that he did not do so.

In brief, pedagogical interventions, which teachers provide for addressing information literacy, are partly shaped by knowledge domains.

4.4.3 Summary for Teachers' Pedagogical Interventions

The following summarizing statements were closely derived from the data although they are presented without the precise numbers here.

When they address concepts and competencies of information literacy, Malotha teachers use a variety of strategies for whole-class teaching, including presenting analogies, discussing, giving examples, having students do exercises, giving them written handouts, doing lectures, modeling, basing their teaching on skills students developed previously, doing it or making decisions for students. They make use of individual or a combination of strategies for

covering information presentation in the first place but also aspects related to knowledge building and information finding; they cover least ethical use of information, the use of information technology, and information control. There are educators who teach their classes to go through an extended research project as a process composed of a sequence of steps whereas others leave it to a librarian. The assessment strategies they use are grading end products (summative assessment) and grading together with a librarian. In the context of extended projects, teachers tend to assess and grade end products if they work alone but if the school librarian is involved, there seem to be teachers who leave the grading completely to her.

Teachers provide individual assistance for concepts and competencies of information literacy to a lesser extent than whole-class teaching. However, they employ a variety of strategies: asking student questions, answering student questions, giving students written handouts, reading what students wrote, making suggestions and comments, doing it for students or making a decision for them, and formative assessment. Teachers tend to help students individually predominantly with aspects related to knowledge construction and least with information presentation and control. Less clear were findings about three other information literacy categories: there seem to be teachers who provide assistance to students with the information process, the location of information, and the ethical use of information, whereas others do not. Participants did not mention individual assistance for the use of information technology.

A teacher's decision to provide whole-class instruction or individual assistance depends partly on the scope of the research task. Indications were strong that whole-class teaching about the research process as such takes place only in extended projects, that teachers provide individual assistance in extended projects predominantly for knowledge building, and that they provide more whole-class teaching about information finding in the context of small tasks rather than extended tasks. Indications were less strong for the general claim that educators provide more individual assistance when students undertake extended research and for teachers helping students on an individual level predominantly with information finding in the context of small research tasks. Controversial were the findings for teachers helping students individually with the process predominantly in extended projects.

The knowledge domain shapes pedagogical interventions that teachers use for information literacy teaching. History teachers at Malotha are more likely to assign research tasks than

their colleagues from language or math and science departments, regardless of the scope of the task. Language teachers are more likely to do whole-class teaching on the research process as such in extended projects and math and science teachers are less likely than there colleagues from the two other departments to provide individual assistance for information finding in extended research tasks. Indications were weaker for language teachers being the most likely to teach students about the ethical use of information, regardless of the scope of the research task and through whole-class teaching and individual guidance, and for science teachers being most likely to do whole-class teaching about the use of information technology. Contradictory were findings for math and science teachers being less likely to provide individual assistance about the research process as such when their students undertake extended projects.

4.5 Teachers' Collaboration with the School Library for IL Teaching

Findings for the fourth research question about teachers' use of the school library and their collaboration with school librarians in the context of research tasks, which they assign to their students, are presented in this section. The following claims were derived from the analysis of the data collected in interviews with administrators, including the head school librarian, and the focus group discussion with students (external perspective), as well as teacher questionnaires and interviews (internal perspective):

Claim 8: The majority of teachers work with the library and they do it in a variety of ways.

Claim 9: The scope of the research task and the knowledge domain shape teachers' practices of collaboration with the school library.

Claim 10: Teachers experience facilitators and inhibitors of collaboration with the school library.

For each of the claims several sub-claims were developed, which are presented in the next subsections. Whenever data were available from more than one source and/or collected with more than one technique, findings were compared or triangulated.

4.5.1 Teachers Adopting a Variety of Practices

Claim 8: The majority of teachers work with the library and they do it in a variety of ways.

For the claim about collaborative practices of Malotha teachers the following sub-claims emerged out of the data:

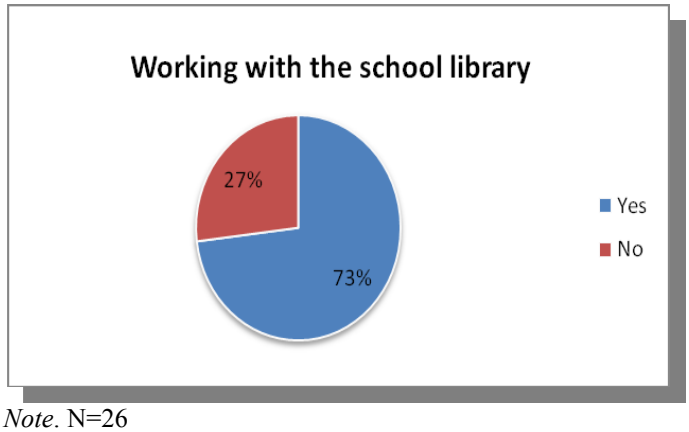
- Sub-claim 8a: The majority of teachers collaborate with the school library.
- Sub-claim 8b: More than one-third of the collaborating teachers use the school library as a space when students undertake research projects.
- Sub-claim 8c: More than half of the collaborating teachers work with school librarians when students undertake research projects.
- Sub-claim 8d: School librarians provide whole-class teaching and individual assistance when students undertake research projects.

4.5.1.1 The majority of teachers collaborating

Sub-claim 8a: The majority of teachers collaborate with the school library.

As far as the external perspective is concerned, two administrators stated that at Malotha there is variety with regard to teachers' library use (Administrator A, par. 75; Administrator B, par. 91-101). Both of them reported about teachers who do not make use of the library at all. Administrator A stated that "some classes would not be in the library and would not have a library assignment through the course of the year" (Administrator A, par. 77). Administrator B claimed that "15 to 25 percent" of their teachers behave in this way (Administrator B, par. 101).

Figure 4-6: Percentage of Teachers Working with the School Library (Questionnaires)



Note. N=26

Only quantitative data are used from teachers (internal perspective), as collected in question 8 in the questionnaire (Appendix 10) and in question 6 about the background information that was gathered prior to each interview (Appendix 6). In questionnaires, 19 (73%) out of the 26 teachers stated that they had already worked with the school library (Figure 4-6). Seven teachers (27%) reported that they had not worked with the library.

Table 4-26: Teachers Working with the School Library (Teacher Interviews)

Teacher	**Working with the school library**	
	Yes	**No**
Teacher A	X	
Teacher B	X	
Teacher C	X	
Teacher D	X	
Teacher E	X	
Teacher F	X	
Teacher G	X	
Teacher H	X	
Teacher I	X	
Teacher J	X	
Teacher K	X	
Total	**11**	**0**

Note. N=11

In interviews, all eleven teachers reported that they had already worked with the school library (Table 4-26). It was not possible to find any teacher who had not used the library in some way or other who would participate in an interview. In the next subsection, findings for educators using the library as a space are presented.

4.5.1.2 Teachers using the school library as a space

During data analysis the distinction between teachers having their students use library resources (as described under 4.3.2) and teachers using the library as a space for teaching appeared. For the latter, the following sub-claim was developed:

Sub-claim 8b: More than one-third of the collaborating teachers use the school library as a space when students undertake research projects.

Three out of the four administrators and five out of the six students reported about research projects taking place in the library (Table 4-27), for example, Administrator B claimed that "a lot of" teachers ask a librarian if they can use the library (Administrator B, par. 80).

Table 4-27: Teachers' Use of the Library as a Space

Perspective	Role	Teachers using the library as a space
External	**Administrators**	No*:/ Yes: 3/4 administrators
	Students	No*: / Yes: 5/6 students
Internal	**Teachers** *(Questionnaire)*	No*: 1/19 teachers Yes: 6/19 teachers – *Details:* • Library: 3/6 • Its computer lab: 2/6 • Library and its computer lab: 1/6

	Teachers
	(Interviews)
		No or not much*: 4/11 teachers - Yes: 7/11 teachers
		Details for both:
		• Library:
		  o Yes: 4
		  o No or not much: 3**
		• Its computer lab:
		  o Yes: 1**
		  o No or not much: 1
		• Library and computer lab:
		  o Yes: 2
		  o No or not much: 1

Note. *Number of participants who explicitly stated that teachers/they do not use the library as a space at all or do not use it as a space much. **One teacher uses the library not much but its computer lab a lot; in the overall counting, he was included in the "yes" group

Teachers distinguished between using the library as such and using its computer lab. Six out of the 19 teachers who wrote in questionnaires that they had already worked with the school's library in some way or other reported about having used it as a space with their classes. Three out of the six mentioned that they had used the library itself, for example, Teacher 25 explained, "we spent time in the library searching for and using books" (QT25, par. 13) and Teacher 2 noted, "The school's library [underlined] facilities [underlined] is very important to

these lesser projects" (QT2, par. 14). Two teachers reported about making use of the computers that are available in the library, and one teacher about using both the library and the lab integrated into it. One of the questionnaire participants, Teacher 21, explicitly stated that he would not work in the library; he wrote that he used the library in order "to access info - books and periodicals that I use in [underlined] my room not in library" (QT21, par. 14).

In interviews, seven out of the 11 teachers reported about making use of the library with classes, among them 4/7 about using the library, 2/7 about using both the library and its lab, and 1/7 about using its computer lab mainly, stating, "with regards to the actual library, I don't do too much" (Teacher B, par. 144) but "we went to the computer lab a lot" (Teacher B, par. 168). Taking the numbers from teacher questionnaires and interviews together, at least one-third of the collaborating teachers seem to make use of the library as a space.

4.5.1.3 Teachers working with school librarians

Sub-claim 8c: More than half of the collaborating teachers work with school librarians when students undertake research projects.

Teachers work with school librarians in the context of research projects. Four aspects of teacher-librarian collaboration emerged out of the data and are briefly defined here as such:

> *Librarians helping teachers in the preparation phase*: Of research projects; librarians helping teachers with scheduling time slots in the library, with sources, with the development of research tasks in terms of content and process; spontaneously, or in a formal meeting; proactively or on the teacher's request;
>
> *Librarians teaching students*: Librarians providing whole-class teaching and individual student assistance;
>
> *Teachers providing class time:* Teachers giving some of their class time to librarians so that they can teach students; the time can be a whole period or a part of a period; can happen on a regular basis or occasionally;
>
> *Teachers attending library sessions:* Teachers' behavior when they expect their students to use the library; joining them or not; teaching students or not.

Table 4-28 gives an overview of the collaborative activities between teachers and school librarians as reported from an external perspective (by administrators and students) and an internal perspective (by teachers in questionnaire and interviews).

Table 4-28: Teachers Working with Librarians in Research Projects

Persp	Role	Librarians helping with preparation	Librarians teaching	Teacher providing class time for librarians to teach class	Teacher attending library session
Ext	**Admin**	2/4 administrators	4/4 administrators; as main teacher: 2 administrators	2/4 administrators	Maybe (1/4 administrator); No: 2/4 administrators
	Students		6/6 students: as main teacher: 1 student	6/6 students	Not always (2/6 students)
Int	**Teachers** *(Q)*	7/19 teachers	7/19 teachers		
	Teachers *(IS)*	4/11 teachers	Yes: 7/11 teachers, (for 4/7 as main teacher, for 3/7 only assisting students individually) No: 2/11 (one of them for one of his two projects)	4/11 teachers	As main teacher (6/11 teachers) When librarian is teaching: Yes: 3/11 teachers, No or not often: 2/11

Note. Abbreviations: Admin = Administrators (including the librarian); Persp = Perspective; Ext = External; Int = Internal; IS = Interviews; Q = Questionnaires

As far as the external perspective is concerned, all four administrators and all six students stated that teachers work with librarians when students undertake research projects. Two administrators reported about librarians helping teachers in the planning phase. For example, Administrator B claimed that 25 percent of teachers get help in that phase in the sense that librarians proactively suggest sources to them in informal meetings (Administrator B, par. 101) and 20 to 25 percent also want some input from librarians for the development of their research project (Administrator B, par. 91). All administrators and all students talked about librarians teaching classes, especially in the context of extended projects. Among them were two administrators and one student who reported about extended projects in which a librarian

acted as leader. Talking in general terms, Administrator B noted that librarians co-teach information literacy with teachers in the sense that both are "equal partners" with about 25 percent of Malotha faculty (Administrator B, par. 91). All six students and two administrators reported about teachers giving librarians some of their class time in order to work with students, for example, an administrator mentioned a teacher who gave the librarian "one of his four classes every week" to teach an extended project (Administrator B, par. 114). Two students and one administrator emphasized that teachers do not necessarily attend their classes' library sessions; this administrator together with another one also provided examples of teachers who do not join their students in the library. They either send students to the library during class time or expect them to use it in their free time. Administrator A explained that these are teachers who integrate the library into their teaching rarely:

> Some of those classes may occasionally have assignments that require students to use library resources, and so students would go on their own, much like they would complete any other assignment on their own, and would connect to library resources and get help from librarians as needed to complete that. (Administrator A, par. 75)

Teachers themselves also reported about working with librarians (internal perspective). In questionnaires, slightly more than half of participants who reported in general terms that they had already worked with the library in some way or other (10/19) wrote that they had collaborated with librarians in the context of research projects. Seven of them noted that librarians had helped them with the preparation, for example, one teacher noted, "They helped gather books for project [title XY]" (QT22, par. 13), and another one wrote, "We have worked together to find suitable topics/areas of interest that will yield profitable intellectual pursuits" (QT26, par. 13). Again seven stated that librarians worked with their students.

In interviews, 10/11 teachers reported about working with librarians in the research tasks they had assigned. However, librarians were involved to varying degrees. Four teachers explained that librarians helped them with scheduling or with the preparation of research projects by providing sources or ideas or both. For example, talking about a small research project, Teacher H reported about planning early with a librarian and the latter suggesting sources as well as helping him to develop the project, noting, "She gave me a couple of ideas to think about and how I might want to move forward with the project. There's just a lot to think about. So, she was helpful with that" (Teacher H, par. 68). Seven educators reported about librarians teaching their classes, either as main teachers (4/7) or in a supportive role (3/7). For

example, in the extended project Teacher I assigned, the head librarian was "the master teacher, the head educator" (Teacher I, par. 148) who together with the other librarians also worked on an individual level with students (Teacher I, par. 96). Teacher I explained:

> Their [librarians'] role then is, once they give the lesson, to make sure that the kids can understand what they're saying. So, they go around the room and just kind of look over the kids' shoulders to make sure that the kids are on target. And they also make themselves readily available for kids to ask questions, as well. (Teacher I, par. 148)

In the extended projects Teacher A assigned, on the other hand, librarians were in a supportive role. Teacher A explained, "So as far as the library doing any specific teaching, I personally don't have them do any of the teaching" (Teacher A, par. 120), but he added, "If I was busy with someone, then they could go to anyone. They could either go to the [head] librarian or one of the staff. They can do that and they do" (Teacher A, par. 126). Two other teachers explicitly stated that librarians do not do any teaching at all in their projects; one of them explained, "I basically just request time-, slot times to use their computer lab and to use the library. And that's it", and he emphasized, "That's the farthest my collaboration has ever gone" (Teacher J, par. 86). Four teachers said that they provided class time so that librarians could teach their classes, for example, "once a week" (Teacher B, par. 42), or on "specific days" (Teacher F, par. 43). Three teachers said that they attend library sessions when librarians teach their classes. For example, Teacher I emphasized that he stayed in the library in order to support the librarian:

> Be in a support role while First Name XY [School Librarian] does individual workshops to get them through the research process. And at any time I'm there for First Name XY [School Librarian] if she needs me to work with students individually (Teacher I, par. 20).

Teacher B would be there only "every now and then" (Teacher B, par. 42) and Teacher F would not attend library sessions at all, noting, "The librarians would be expecting us, and I would drop my students off, and the librarians would then work with them during that period" (Teacher F, par. 43). Altogether six educators reported about acting themselves as project leaders and teaching their classes on their own in the library.

Summary for teachers working with the school librarian

More than half of collaborating faculty works with librarians. In questionnaires, slightly more than half of educators who had already worked with the library in some way or other (10/19) stated that librarians were involved in the planning phase of research projects or in the actual

teaching; numbers where higher in interviews, with 10/11 teachers reporting so. Supporting evidence for this claim was found in interviews with all four administrators and from all six students in the focus group discussion, as they gave examples of research projects in which librarians were involved by teaching students. Librarians may either act as project leaders (4/11 teachers; 2/4 administrators; 1/6 students) or as support for teachers. Six out of the eleven interviewed teachers reported about teaching students on their own in the library, but the finding was not supported by data from other sources or the teacher questionnaire. Findings for teachers attending library sessions are contradictory (yes: 3/11 interviewed teachers; sometimes: 2/6 students, 1/4 administrators, 1/11 interviewed teachers; no: 2/4 administrators, 1/11 interviewed teachers). More details about the information literacy concepts and competencies that librarians teach students are provided in the next section.

4.5.1.4 School librarians providing pedagogical interventions

Sub-claim 8d: School librarians provide whole-class teaching and individual assistance when students undertake research projects

In this section librarians' involvement in research projects is described in more detail. Study participants reported about librarians providing whole-class teaching and individual assistance. However, it was not possible to develop a description that was as detailed as that for teachers (section 4.4.1) because participants did not provide as much information about the pedagogical strategies librarians used as they did for teachers. Therefore, the focus here is on information literacy concepts and competencies that librarians addressed with students. First their practices of whole-class teaching are described and then those of individual assistance.

4.5.1.4.1 School librarians doing whole-class teaching

In all groups who participated in the study, there were members who talked about Malotha librarians doing whole-class teaching (3/4 administrators, 3/6 students, 5/19 teachers in questionnaires who reported that they had already worked with the library, and 5/11 interviewed teachers). Two of the five questionnaire participants wrote in general terms that librarians taught their classes about information literacy in BRP11 (QT5, par. 13; QT14, par. 13). The other three together with all other study participants mentioned at least one of the following information literacy categories: completion of the research projects as a process composed of a number of steps, information finding, information control, knowledge

building, ethical use of information, and the presentation of information. No respondent reported about librarians providing instruction about the use of information technology. Table 4-29 displays what the various groups of study participants reported about librarians' whole-class teaching for the seven information literacy categories.

Table 4-29: Librarians Providing Whole-Class Teaching in Research Projects

Perspective	IL categories / Role	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
External	**Administrators**			X		X		X
	Students			X		X		X
Internal (Q)	**Teachers**			X				
Internal (IS)	**Teacher A**							
	Teacher B	X				X	X	X
	Teacher C	X		X	X	X	X	X
	Teacher D							
	Teacher E							
	Teacher F	X		X, X		X	X	X
	Teacher G							
	Teacher H							
	Teacher I	X			X			X
	Teacher J							
	Teacher K			X				

Note. **Abbreviations:** IS = Interviews; Q = Questionnaires; **Colors**: Blue = Extended research tasks; Orange = Small-scale research tasks

School librarians doing whole-class teaching about how to go through an extended research project as a process composed of a number of steps

Only teachers and only in interviews reported about librarians teaching classes on how to complete a research process, which they teach only for extended projects. Four out of the eight interviewed teachers who had already assigned this type of project did so. Teacher F noted that "kind of the librarian's job was the process" (Teacher F, par. 41). Two teachers

reported that a librarian presented the project to students as a combination of individual steps (Teacher C, par. 78; Teacher I, par. 88) and that librarians taught lessons about each of them (Teacher C, par. 35; Teacher I, par. 148). They used a lecture style of teaching that was based on a book (Teacher B, par. 52-54; Teacher I, par. 156) to which they adhered closely (Teacher I, par. 158).

School librarians doing whole-class teaching on how to find information in a variety of sources

Each time three teachers in questionnaires and interviews stated that librarians instructed their classes on how to find information in a variety of sources when they undertook research projects. For example, a questionnaire participant wrote: "Librarians introduce students to info. outlets - Reference volumes, databases … and do an excellent [underlined] job of it here. Very organized. Excellent handouts and resources" (QT4, par. 13). One of the interviewed teachers described how a librarian taught one of his classes about searching the library and databases (Teacher K, par. 59). The class would be in the library computer lab, the librarian would give a lesson, and students would do exercises on an invented topic: "And some of these classes rely very heavily on the librarians where we might just, I, as a teacher, may just give that over to them and have them handle the practical measures of accessing these spaces" (Teacher K, par. 61). Two administrators and one student also reported about librarians doing whole-class teaching about information finding, for example in the context of BRP9 (Administrator B, par. 113; Administrator C, par. 23, 53) and BRP11, for which Student 5 described how the librarians taught students how to search databases:

> Last year, we had a junior research paper and Ms. XY [School Librarian] and all the librarians they taught us. We had to go on a database, and we had to search like our title of our paper, but we couldn't use the exact words. So we had to think of like I guess like outside of our topic. And we had to put them into an advanced search bar. (Student 5, par. 201)

School librarians doing whole-class teaching on how to control information

Only interviewed teachers and only in the context of an extended project, reported about librarians offering whole-class teaching on information control. Two of the eight who had assigned this type of research task noted that a librarian taught students to control and organize the information they collected in BRP11: She had them keep a research folder that she provided for them (Teacher C, par. 102; Teacher I, par. 98).

School librarians doing whole-class teaching on how to use the collected information in order to build new knowledge and extend existing knowledge

Three of the interviewed teachers explained that a librarian taught their students about aspects related to knowledge building in BRP11. Teacher B said that one of Malotha librarians addressed topic selection with his class, explaining, "They went one day and they didn't know anything, and they came back the next day and they knew exactly what they were going to study" (Teacher B, par. 50). Together with another teacher he noted that librarians also taught students how to evaluate information, that is, the "authenticities of each [source], is this valued or is this valued" (Teacher B, par. 54), the characteristics of "a good source", "what's opinion and what's not" (Teacher F, par. 32), and about the reliability of sources (Teacher F, par. 41). And Teacher C reported about a librarian teaching students how to summarize information (Teacher C, par. 102). Two students also explained how a librarian taught them to extract information in BRP11 (Student 5, par. 201, 207). Student 3 noted "Yeah, they [the librarians] did ask you to basically summarize it in your own words, on how or what you took from the article, or what interests you from the article" (Student 3, par. 208). Talking in general terms, Administrator C claimed that librarians "talk" to students about how to evaluate the results of a search with a search engine and how to evaluate a free online encyclopedia (Administrator C, par. 23).

School librarians doing whole-class teaching on how to use information ethically

Three interviewed teachers reported that a librarian taught students about citations in BRP11. Teacher C mentioned that the head librarian taught students about the importance of documenting sources (Teacher C, par. 102) and all noted that she taught their classes how to do it (Teacher B, par. 54; Teacher C, Par. 97, 110-111; Teacher F, par. 41).

School librarians doing whole-class teaching on how to present information

As far as the formats of presentation are concerned, three of the interviewed teachers noted that a librarian taught students how to write an extended research paper. Teacher B said that the librarian taught students "how to construct that paper" (Teacher B, par. 54). He felt that the explanations were extremely detailed and the requirements tight, leaving not much space for individual freedom (Teacher B, par. 54). Teacher F stated that librarians taught students the "methodology of how to write the stuff up" (Teacher F, par. 34) and "how you put it all together" (Teacher F, par. 41). He also noted that it is one of their strengths: "They know how

to write papers" (Teacher F, par. 53). Teacher I reported about librarians teaching students how to write different elements of a scientific paper, mentioning the methodology (Teacher I, par. 148) and the introduction and describing how they taught the latter by giving students examples first and then asking them to do it the same way (Teacher I, par. 154). Two students explained how the librarians taught them how to use the summaries they wrote in their own words as a basis for their papers (Student 3, par. 208). Student 5 stated, "So you'd have like eight summaries of what you wrote and you can just take that, type it up and that would be part of your paper" (Student 5, par. 209). Administrator B noted that a librarian taught students how to do an oral presentation in BRP9 (Administrator B, par. 113).

As far as summative assessment is concerned, four interviewed teachers reported about librarians participating in the grading of the research paper in BRP11. Teacher B explained that the head librarian grades the paper first, before he does it, grading it for "the writing technique" and citations (Teacher B, par. 68). She "does a very thorough job" and "goes through it word by word by word. ... Every word is graded" (Teacher B, par. 68). He considered the librarian as an expert: "I'm obviously going to respect First Name XY [School Librarian]'s grading of it because she knows and I don't" (Teacher B, par. 68). Teacher F stated that the librarian grades the paper "for all the research aspects" (Teacher F, par. 43-45). Teacher I reported "that First Name XY [School Librarian] gives a grade on the mechanics of the paper, like proper citations, proper structure and all that" (Teacher I, par. 56) and "effort" (Teacher I, par. 58). Teacher C said that aspects librarians address are citations (Teacher C, par, 97) as well as form and spelling (Teacher C, par. 89); he questioned the necessity and importance of the librarian's grading but concluded that it is the librarian's decision and that he does not have a say in it (Teacher C, par. 108-111). Also in the context of BRP11, two students reported that the librarian graded their paper (Student 1, par. 321; Student 5, par. 347) and Administrator D noted that the librarian grades it for "the information part" (Administrator D, par. 74).

Summary for school librarians' whole-class teaching of information literacy

School librarians provide whole-class teaching about information literacy concepts and competencies, as reported by administrators (3/4), students (3/6) (external perspective), teachers in questionnaires (5/19 who had already worked with the library in some way or other) and interviews (5/11) (internal perspective). Best supported is librarians teaching classes about information finding (with evidence from 3/11 interviewed teachers, 3/19

teachers in questionnaires, 2/4 administrators, and 1/6 students). Questionnaire participants did not write about Malotha information professionals teaching other information literacy categories. The next best supported are information presentation and then knowledge building. Instruction about information presentation (mentioned by 4/11 interviewed teachers, 3/6 students, and 2/4 administrators) included teaching how to present information in written or oral format and doing summative assessment. Librarians instructing classes about aspects related to knowledge building (mentioned by 3/11 interviewed teachers, 2/6 students, and 1/4 administrators) included teaching information evaluation and extraction. Librarians doing whole-class teaching about all other information literacy categories was only reported by interviewed teachers, and included librarians teaching about the information process (mentioned by 4/11 teachers), about ethical use of information (mentioned by 3/11 teachers), and about information control (mentioned by 2/11 teachers). No study participant reported about librarians teaching classes on how to use information technology.

The next subsection presents findings for individual student assistance provided by school librarians.

4.5.1.4.2 School librarians providing individual student assistance

Members of all groups of study participants talked about librarians providing individual assistance for students who undertake research tasks (3/4 administrators, 5/6 students, 3/19 teachers in questionnaires who reported that they had already worked with the library, and 5/11 interviewed teachers). They did it for completion of the research task as a process, information finding, knowledge building, information documentation, and information presentation (Table 4-30). No study participant noted that Malotha librarians help students on an individual level with the use of information technology and information control.

School librarians assisting students individually with the process as such

Two of the interviewed teachers reported in general terms about librarians providing individual student assistance with the information process as such (Teacher F, par. 41). For example, Teacher I reported that the individual help that the librarians provide is crucial to make students go through the research process in BRP11, noting:

> Librarians they do a real nice job for the kids that don't get it. First Name XY [School Librarian] yanks them out and says, "Go work with so-and-so." And it's through that individualized instruction kids do get it. (Teacher I, par. 96)

Table 4-30: Librarians Providing Individual Student Assistance in Research Projects

Perspective	IL categories / Role	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
External	**Administrators**			**X, X**		**X**		
	Students			**X**		**X**		**X**
Internal (Q)	**Teachers**			**X**				**X**
Internal (IS)	**Teacher A**			**X**				
	Teacher B							
	Teacher C			**X**				**X**
	Teacher D							
	Teacher E							
	Teacher F	**X**		**X**				
	Teacher G							
	Teacher H			**X**		**X**		**X**
	Teacher I	**X**				**X**	**X**	**X**
	Teacher J							
	Teacher K							

Note. **Abbreviations:** IS = Interviews; Q = Questionnaires; **Colors**: Blue = Extended research tasks; Orange = Small-scale research tasks

School librarians assisting students individually when they are searching for information in a variety of sources

Four of the interviewed teachers and three who participated in questionnaires talked about librarians helping students with information finding. For example, Teacher A reported about librarians providing resources and especially books for students on an individual level in BRP10, noting:

> This library is very, very good at enriching the resources that already exist here. So, for example, the library staff knows what each of these 10th graders is pursuing in their resources. They look for materials. They suggest books. If they come across something in their evaluation of materials, they are really good about bringing it to our students' attention. (Teacher A, par. 120)

Teacher H noted that the librarians "helped to gather a lot of the information that the students used" (Teacher H, par. 32) and they located sources for students and helped students do it on their own:

> But the librarians also brought them some different books about [topic], really kind of helped them look for the research, helped them look through other libraries, in some cases, and their collections and what they might have, just to help develop their research. (Teacher H, par. 72)

In questionnaires, Teacher 18, for example, wrote: "The librarians help a lot with locating data banks" (QT18, par. 13). One administrator and 5/6 students also stated that librarians help students individually with information location. Talking about BRP10, Student 3 mentioned that librarians helped him find information and found it for him (Student 3, par. 219) and Student 6 emphasized that the teacher helped him "a lot more" with choosing and focusing his topic, whereas the librarian "really helped" with finding information (Student 6, par. 353). Talking about research tasks in general terms, Administrator C reported about students getting help with finding information, noting, "The librarians will order books for students through interlibrary loan, they'll assist them getting any information that they need" (Administrator C, par. 45).

School librarians assisting students individually when they are using the information they located in order to build new knowledge and to extend their existing knowledge

Two interviewed teachers, two administrators, and one student reported about librarians providing individual assistance for aspects related to knowledge building. One of the teachers and the student explained that librarians guided students individually through topic selection in extended projects (Teacher H, par. 72); the student emphasized that a librarian told him to narrow down his topic in order to be able to find information (Student 4, par. 224). The other teacher and one of the administrators mentioned that librarians helped students to engage with and extract information in BRP11. Teacher I stated: "Reading and summarizing a peer-reviewed study, I struggle with, a lot of times I turn that over to First Name XY [School Librarian]" (Teacher I, par. 54). And he described how the librarian helped students who had difficulties with reading:

> First Name XY [School Librarian] has a great philosophy there ... First Name XY [School Librarian] says, "You know what, if you don't understand a sentence or two, just keep going. Don't say, 'Oh my God, I don't understand,' and [... tape unclear] your hands. Keep reading and see if you can pick it up again. If you can't, this is of no use, you got to throw it out." But she encourages the kids to try to get past that initial, "I

> don't get this," and see if reading on, they can pick it up. If not, throw it out. ... Find another one. (Teacher I, par. 80; 82)

Another strategy the librarian uses is reminding these students to select shorter texts (Teacher I, par. 82). Administrator B explained how a librarian helped a student to read and understand a text in BRP11 by using an analogy (Administrator B, par. 85). The two administrators stated that librarians guide students in their evaluation of sources (Administrator B, par. 85; Administrator D, par. 42). And the second teacher noted that librarians helped students with analyzing information and developing a personal perspective. He said that the librarians "also had kind of important discussions with students about ... what they're thinking" (Teacher H, par. 72).

School librarians assisting students individually with the ethical use of information

Only one study participant, a teacher in an interview, noted that librarians helped students with the ethical use of information. Teacher I said that he sent students to a librarian if they were encountering problems with citations (Teacher I, par. 50).

School librarians assisting students individually when they are presenting information

Three teachers in interviews, one in a questionnaire, and one student reported about librarians helping students with information presentation. One of the teachers and the student noted that librarians helped with presenting information in written format in BRP11. Teacher I described how they follow each student closely when they write their introduction: "Then the kids will sit down and start writing their introduction while the librarians come around to make sure that they are getting it correct" (Teacher I, par. 154). Student 6 compared the help he received from librarians and teachers, noting, "The librarians really helped out more with the actual writing of the paper" (Student 6, par. 353). Teacher H explained that the librarians helped students with preparing the presentations of their findings in oral format and especially with adapting them to the audience, a group of younger students:

> Maybe they [students] have all given talks to their peers, before, but how do you present information now to a younger set of students? And I think they [librarians] helped with that a lot, in narrowing down what they're talking about, and also making sure that the level of material was appropriate. (Teacher H, par: 72)

Two of the interviewed teachers and the questionnaire participant reported about librarians revising rough drafts (QT18, par. 13). Teacher I noted that the librarians make suggestions for improvement (Teacher I, par. 88). Teacher C reported about librarians doing corrections for

students, saying, “Once they [students] write the paper, they [librarians] read it and correct it for them, which is pretty amazing. I mean, it's a lot of time they have to spend on it” (Teacher C, par. 87).

Summary for individual assistance provided by school librarians regarding information literacy

School librarians providing individual student assistance was reported by administrators (3/4), students (5/6), and teachers in questionnaires (3/19 who had already worked with the library) and interviews (5/11). With regard to information literacy concepts and competencies with which librarians helped students, again information finding is the best supported and the only information literacy category for which there was evidence from all sources and techniques (4/11 teachers in interviews and 3/19 in questionnaires, 5/6 students, and 1/4 administrators). The next best supported, with similar strength of evidence, are librarians providing individual guidance for information presentation (3/11 interviewed teachers, 1/19 in a questionnaire, and 1/6 student) and aspects related to knowledge building, that is, for topic selection, engagement with information, extraction of information, and analysis of information (2/11 interviewed teachers, 2/4 administrators, and 1/6 students). Only interviewed teachers reported about librarians helping students with the process as such (2/11) and the ethical use of information (1/11). No study participant stated that librarians helped students with the use of information technology and information control.

4.5.2 Intervening Conditions

There are a number of factors that influence teachers’ approaches to collaboration with the school library. In this section, evidence for the following claims and sub-claims is presented:

Claim 9: The scope of the research task and the knowledge domain shape teachers’ practices of collaboration with the school library.

- Sub-claim 9a: The scope of the research task shapes teachers’ practices of collaboration with the school library.
- Sub-claim 9b: The knowledge domain shapes teachers’ practices of collaboration with the school library.

Claim 10: Teachers experience facilitators and inhibitors of collaboration with the school library.

- Sub-claim 10a: The facilitators of collaboration with the school library that teachers experience are related to the library, librarians, the relationship between teachers and librarians, as well as teachers.
- Sub-claim 10b: The barriers to collaboration with the school library that teachers experience are related to librarians, time, teachers, the library, and the relationship between teachers and librarians.

4.5.2.1 The scope of the research task

Sub-claim 9a: The scope of the research task shapes teachers' practices of collaboration with the school library.

As explained in 4.3.1.2, the primary mechanisms for information literacy teaching used by teachers are small-scale and extended research tasks. Evidence was found that teachers' use of the school library and their cooperation with librarians depends partly on the scope of the research tasks.

Educators tend to use the library as a space mainly when they assign extended research tasks. Teachers reported more about using the library with classes in the context of extended than small-scale projects (Table 4-31). In questionnaires, four out of 15 teachers wrote that they used the library as a space for extended projects vs. four out of 20 for small-scale research tasks. In addition, in the context of small projects, one participant stressed that he would use the library's resources but not work there with his classes. In interviews, all eight teachers who had assigned extended projects said that they made use of the library as a space and five of them noted that it served as their main room. One of these teachers reported about two of his extended projects, one taking place in and the other one outside the library in a computer lab in a different part of the school building. With regard to small-scale projects they had assigned, six out of ten interviewed teachers reported about using the library as a space not much or not at all, among them one who noted that he would not work in the library outside extended projects. In addition, one teacher emphasized that he does not use the library itself much, but makes extensive use of its computer lab. Only three of his colleagues noted that they work with classes in the library in the context of small projects.

Table 4-31: Teachers' Use of the Library as a Space by Research Tasks (Summary)

Perspective	Role	Scope of research tasks	
		Extended	**Small-scale**
External	**Administrators**	3/4 administrators	3/4 administrators: "a lot of teachers" (Admin B); "teachers are very willing" (Admin C)
	Students	5/6 students	1/6 students: Class using computers
Internal	**Teachers** *(Questionnaire)*	Yes: 4/15 teachers – *Details:* Library: 3/15* teachers Its computer lab: 1/15 teachers	No: 1/20* teachers Yes: 4/20 teachers – *Details:* Library: 1/20 teachers Its computer lab: 2/20 teachers Library and its computer lab: 1/20 teachers
	Teachers *(Interviews)*	Yes: 8/8 **teachers (one of them for one of his two projects only)	Library and its computer lab: Yes: 3/10*** No or not much: 6/10 teachers And 1/10 teachers library not much but computer lab a lot

Note. * Out of the 15 questionnaire participants who had assigned extended and out of the 20 who had assigned small-scale projects. ** Out of the eight interviewed participants who reported about extended projects. *** Out of the nine interview participants who reported about their small-scale projects plus one teacher who said that he did not work with the library outside his extended project and who did not talk about any of his small-scale projects.

Teachers' extensive use of the library as a space for extended projects was confirmed by findings from interviews with administrators and students. Taken together, three out of the four administrators explained that it plays a major role in the school's three scheduled research programs in grade 9 (BRP9), grade 10 (BRP10), and grade 11 (BRP11). Student 3 explicitly mentioned that from grades 9 to 11, every year teachers have collaborated with the library in an extended research project (Student 3, par. 285), and five out of the six students reported about working in the library with their classes in the context of BRP11. The finding from teacher interviews and questionnaires that educators use the library with classes less in small-scale tasks was supported by findings from the student focus group discussion in the sense that only one student reported about a teacher working with a class in the library in the context of this type of projects, and he explained that they used the library computers. It was not supported by findings from interviews with administrators. Three of them said that

Malotha teachers do make use of the library with their classes in the context of small-scale projects, two of them even emphasized that "a lot of teachers" do so (Administrator B, par. 80) or that "teachers are very willing" to do so (Administrator C, par. 30). However, their statements should be considered with precaution; it could be that administrators expressed their own wishes rather than the practices of their faculty.

Table 4-32: Teachers Working with Librarians in Extended Research Projects

Persp	Role	Teachers working with librarians			
		Librarians helping with preparation	**Librarians teaching**	**Teacher providing class time for librarians to teach class**	**Teacher attending library session**
Ext	**Admin**		4/4 administrators; as main teacher: 2 administrators	2/4 administrators	Maybe (1 administrator)
	Students		6/6 students; as main teacher: 1 student	Yes: 6/6 students	Not always (2/6 students)
Int	**Teachers** *(Q)*	4/15* teachers	6/15 teachers		
	Teachers *(IS)*		Yes: 6/8** teachers, (for 4/6 as main teacher, only assisting students individually for 2/6) No: 1/8 teachers and another teacher for one of his two projects	Yes: 4/8 teachers	Yes, as main teacher (4/8 teachers) <u>When librarian is teaching:</u> Yes: 3/8 teachers No or not often: 2/11

Note. Abbreviations: Admin = Administrators (including the librarian); Persp = Perspective; Ext = External; Int = Internal; IS = Interviews; Q = Questionnaires;

* Out of the 15 questionnaire participants who had assigned extended projects. ** Out of the eight interview participants who reported about extended projects.

Librarians get involved mainly when students undertake extended research tasks. As shown in Table 4-32, all four administrators, all six students, six out of the 15 teachers who reported in questionnaires that they had assigned extended tasks and six out of eight teachers who took part in interviews and who talked about this type of project reported about librarians working

with students in extended projects. As shown in Table 4-33, three out of the four administrators, no student, only two out of the 20 teachers who reported in questionnaires that they assigned small-scale projects and in interviews only one out of the nine teachers who talked about this type of project reported about librarians providing pedagogical interventions to classes in small-scale projects. Librarians acting as project leaders or main instructors was mentioned only in the context of extended research tasks and educators giving up some of their class time so that librarians can work with students as well; the provision of class time was reported by two out of the four administrators, all six students and half of the interview participants who had assigned extended projects.

Table 4-33: Teachers Working with Librarians in Small-Scale Research Projects

		Teachers working with librarians			
Persp	**Role**	**Librarians helping with preparation**	**Librarians teaching**	**Teacher providing class time for librarians to teach class**	**Teacher attending library session**
Ext	**Admin**	2/4 administrators	3/4 administrators		No: 2/4 administrators
	Students				
Int	**Teachers** *(Q)*	3/20* teachers	2/20 teachers		
	Teachers *(IS)*	4/9 ** teachers	1/9 teacher		Yes, as main teacher (3/9 teachers) When librarian is teaching: Yes (1/9 teacher)

Note. Abbreviations: Admin = Administrators (including the librarian); Persp = Perspective; Ext = External; Int = Internal; IS = Interviews; Q = Questionnaires;

* Out of the 20 questionnaire participants who had assigned small-scale projects. ** Out of the nine interview participants who reported about small-scale projects.

The findings for librarians helping teachers with the preparation mainly in the context of small-scale research tasks, for example, by providing sources and/or ideas, are contradictory. Administrators (2/4) and interviewed teachers (4/9 who had assigned this type of task) mentioned it only for small-scale projects whereas the majority of questionnaire participants mentioned it in the context of extended tasks (4/15 vs. 3/20 for small-scale projects).

As described in detail in 4.5.1.4, school librarians provide pedagogical interventions in the form of whole-class teaching and individual student assistance for particular information literacy categories. Study participants did not talk much about librarians' interventions in the context of small-scale research tasks (Table 4-34).

Table 4-34: Librarians Providing Whole-Class Teaching and Individual Assistance in Small-Scale Projects

Perspective	IL categories / Role	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
External	**Administrators**			I		C		
	Students							
Internal *(Q)*	**Teachers**							
Internal *(IS)*	**Teacher A**							
	Teacher B							
	Teacher D							
	Teacher E							
	Teacher F			C				
	Teacher G							
	Teacher H							
	Teacher J							
	Teacher K			C				

Note. Abbreviations: C = Teaching the whole class, I = Assisting students individually, IS = Interviews, Q = Questionnaires

Only one administrator said that librarians teach aspects of knowledge building to classes as a whole and guide students individually when they search for information in small research tasks. No student in the focus group discussion and none of the teachers who completed a questionnaire addressed the issue and only two teachers in interviews; they reported about a librarian teaching their classes about information finding. And one interview participant emphasized that librarians are extremely busy with extended projects so that they do not have time to get involved in other projects:

> I think they would like to be more helpful, but I think they're very busy, and I don't think they have the time to sit down and really collaborate in terms of setting up

research units with the classes that they're not already teaching, you know. (Teacher G, par. 51-52)

In the context of extended tasks, librarians are involved in the teaching of the completion of the project as a process composed of a number of steps, information finding, information control, knowledge building, ethical use of information, and presentation of information (Table 4-35).

Table 4-35: Librarians Providing Whole-Class Teaching and Individual Assistance in Extended Projects

Perspective	IL categories / Role	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
External	**Administrators**			**C, I**		**I**		**C**
	Students			**C, I**		**C, I**		**C, I**
Internal *(Q)*	**Teachers**			**C, I**				**I**
Internal *(IS)*	**Teacher A**			**I**				
	Teacher B	**C**				**C**	**C**	**C**
	Teacher C	**C**		**C, I**	**C**	**C**	**C**	**C, I**
	Teacher F	**C, I**		**C, I**		**C**	**C**	**C**
	Teacher H			**I**		**I**		**I**
	Teacher I	**C, I**			**C**	**I**	**I**	**C, I**
	Teacher J							
	Teacher K							

Note. Abbreviations: C = Teaching the whole class, I = Assisting students individually, IS = Interviews, Q = Questionnaires

Librarians' teaching of information finding and information presentation in extended projects was reported in all types of data. For information finding evidence was found in interviews with teachers (for information presentation: 5/8 who assigned this type of project; for information finding: 4/8), in teacher questionnaires as well as in interviews with administrators and students. All groups, except teachers in questionnaires, reported school librarians' involvement in the teaching of aspects related to knowledge building. Only teachers, and they did so only in interviews, addressed the librarians' teaching of the information process (4/8), the ethical use of information (4/8), and information control (2/8).

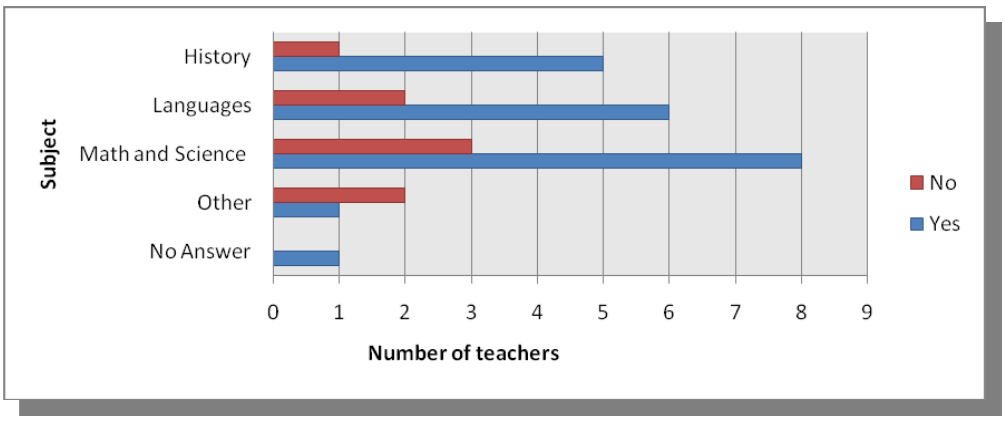
In brief, findings indicate that teachers' approaches to collaboration with the school library depend partly on the scope of research tasks. The next subsection presents findings for knowledge domains as intervening conditions.

4.5.2.2 The knowledge domain

Sub-claim 9b: The knowledge domain shapes teachers' practices of collaboration with the school library.

Several differences between teachers' approaches to library use and collaboration with librarians depending on the subjects they teach were identified. The first hint was found in interviews with administrators. Administrator A explained that "there is variety" at their school with regard to collaboration and noted that it takes place in history courses rather than math courses (Administrator A, par. 77). This finding was confirmed during analysis of questionnaires, where more history teachers reported about working with the library than math and science teachers or language teachers (Figure 4-7). When teachers were asked in general terms if they had ever worked with the library (Appendix 10, question 8), about three-fourths reported that they had done so in both the math and science group (8/11 or 73%) and the language group (6/8 or 75%). In the history group more teachers (5/6 or 83%) wrote that they had already worked with the library.

Figure 4-7: Teachers Working with the Library by Subjects (Questionnaires)



Note. N=29

Another difference between subjects found in teacher questionnaires and interviews was the way in which teachers use the library as a space when their students undertake research projects (Table 4-36).

Table 4-36: Teachers' Use of the School Library as a Space by Subjects

Subject	Source	Using the library as a space
History	Teacher questionnaires*	QT24 (For extended projects)
	Teacher interviews	As main room for extended projects: Teacher H, I For other projects: Yes: Teacher H No: Teacher I
Languages	Teacher questionnaires*	QT25 (For extended projects) No: QT21 (For small projects)
	Teacher interviews	For extended projects: Teacher A, J, K For other projects: Yes: Teacher J, K No or not much: Teacher A, D, G
Math and Science	Teacher questionnaires*	Library and its computer lab: QT3 (For small projects) Computer lab: QT6 (For small projects), QT22 (For both types of projects)
	Teacher interviews	As main room for extended projects: Teacher B, C, F (for one of his two projects) For other projects: Yes: Teacher B (computer lab) No or not much: Teacher B (library), E (computer lab), F

Note. *In questionnaires, Teacher 2 (QT2) did not provide any information about the subjects he was teaching and could not be taken into account here

Findings are contradictory for science teachers working more often with classes in the library when their students undertake small research. Among the six teachers who reported in questionnaires about using the library as a space, one teacher did not identify the subjects he was teaching (QT2) and could not be taken into account. Among the remaining five, only the three science teachers (QT3, QT6, QT22) wrote that they use the library with classes in the context of small-scale research tasks; a language teacher even emphasized that he does not do so. But the finding was not supported by evidence from interviews where 1/2 history teachers, 2/5 language teachers and only 1/3 science teachers reported about using the library for small-scale research projects. Stronger is the evidence for the finding that science teachers tend to use its computer lab when they make use of the library outside extended projects. In both questionnaires and interviews only science teachers distinguished between using the library as such and its computer lab, and they did so for small-scale tasks only. Also, in questionnaires, 2/3 science teachers reported about using the computer lab for small projects. In interviews,

1/3 science teachers emphasized that he makes extensive use of the lab but not the other spaces in the library and 1/3 teachers said that he had used the library lab in the past but did not do so any longer because his students have access to the internet in his classroom now (Teacher E, par. 51).

In interviews, all three science teachers (Teacher B, C, and Teacher F for one of his projects) and the two history teachers (Teacher H and I) said that they use the library as the main room for extended research projects. In the language group, the three teachers (Teacher A, J, K) who had assigned extended projects also work with their classes in the library but spend most of the time in their classroom. The findings could not be supported by questionnaire data because respondents did not distinguish between using the library as main room or not.

Librarians' involvement in research projects at Malotha also depends partly on the knowledge domain. With regard to their participation in the preparation of research projects, findings are highly controversial. As shown in Table 4-37, out of the seven teachers who wrote in questionnaires that librarians helped to prepare research tasks which they wanted their students to undertake, three taught science, two history, and one taught both subjects. One teacher (QT2) did not provide any information about his subjects and could not be taken into account. In interviews, no science teacher, one of the two history teachers and three out of the five language teachers said they prepared research tasks together with a librarian. History teachers were the only ones who reported in questionnaires (QT1, QT5, QT17) as well as in interviews (Teacher H) about librarians' involvement in the planning of research tasks. Administrator B, on the other hand, provided examples of a language teacher who asked a librarian for help in the planning phase of the small research project (Administrator B, par. 58; 62) and of a math and science teacher who wanted "a little bit" of input from a librarian about possible topics and resources (Administrator B, par. 65).

Findings are much clearer for librarians' involvement in the actual teaching. History and science teachers tend to work more closely with librarians than language teachers when their students undertake research projects. In questionnaires, four (QT12, QT14, QT18, QT26) out of the seven teachers who wrote that librarians taught their students were science teachers, two (QT5, QT17) were history teachers and only one (QT4) was a language teacher. In the context of small-scale research tasks, Administrator B reported about a history teacher who asked a librarian to teach information literacy to his classes (Administrator B, par. 40) and a math and science teacher who, after having prepared the project with a librarian, sent students

to the library and, himself staying in the classroom, wanted the librarian to help students (Administrator B, par. 65). And he described a more superficial kind of collaboration where a language teacher sent an email to ask a librarian if she could immediately "tutor" the class (Administrator B, par. 81).

Table 4-37: Teachers Working with Librarians by Subjects

Subject	**Source**	**Teachers working with librarians**			
		Librarians helping with preparation	**Librarians teaching**	**Teacher providing class time**	**Teacher attending library session**
History	Teacher (Q)*	QT1 (subject 1), QT5, QT17	QT5, QT17		
	Teacher (IS)	Providing sources and ideas: Teacher H	Yes: Teacher H As main teacher: Teacher I	Yes: Teacher I	As main teacher: Teacher H When librarian is teaching: Teacher I
Languages	Teacher (Q)*		QT4		
	Teacher (IS)	Providing sources: Teacher D, G Scheduling: Teacher J	Yes: Teacher A (but only assisting), K No: Teacher J		As main teacher: Teacher A, G, J, K When librarian is teaching: Teacher K
Math and Science	Teacher (Q)*	QT1 (subject 2), QT12, QT22, QT26	QT12, QT14, QT18, QT26		
	Teacher (IS)		As main teacher: Teacher F (in one project), B, C No: Teacher F (for one project)	Yes: Teacher F (for one project), B, C	As main teacher: Teacher B When librarian is teaching: Yes: Teacher C No or not often: Teacher B, F

Note. Abbreviations: Q = Questionnaires, IS = Interviews;

*In questionnaires, Teacher 2 (QT2) did not provide any information about the subjects he was teaching and could not be taken into account here.

From interviews with teachers it became clear that librarians acted as the principal teacher only in projects that science teachers (Teacher B, C, F) and history teachers (Teacher I) assigned. When they worked in the library, language teachers themselves tended to act as the main teachers for their students, with four out of the five language teachers reporting having done so (Teacher A, G, J, K). Table 4-38, gives an overview of the information literacy categories for which librarians provided whole-class teaching and individual assistance in extended projects organized according to knowledge domains.

Table 4-38: Librarians Providing Whole-Class Teaching and Individual Assistance in Extended Research Projects by Subjects

Subject	IL categoires / Teacher	Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
History	**Teacher H**			**I**		**I**		**I**
	Teacher I	**C, I**			**C**	**I**	**I**	**C, I**
Languages	**Teacher A**			**I**				
	Teacher J							
	Teacher K							
Math and science	**Teacher B**	**C**				**C**	**C**	**C**
	Teacher C	**C**		**C, I**	**C**	**C**	**C**	**C, I**
	Teacher F	**C,I**		**C, I**		**C**	**C**	**C**

Note. Abbreviations: C = Teaching the whole class, I = Assisting students individually

Only one language teacher (Teacher A) talked about librarians getting involved with his classes by helping students on an individual level with finding sources. The two history teachers and all three science teachers reported about librarians teaching their classes about various information literacy categories through whole-class teaching and individual assistance. The findings were confirmed by two of the external participants, Administrator B and D. Administrator B reported that some of the science teachers and a librarian "co-teach" BRP11 (Administrator B, par. 34). Administrator D emphasized that librarians' involvement is more intense with science teachers in BRP11 than with English teachers in BRP10 (Administrator D, par. 74). He explained:

> I think the collaboration is most significant with the [Grade 11 Research Project]. I think virtually all of the science teachers work with the librarians, and that collaboration is a shared project from the day the students begin the process until the day that it is concluded, including the grading. ... I would say English teachers, not only in terms of

> the kind of project that I was describing earlier [BRP10], but they will use the librarians quite a bit in terms of any number of projects that they are doing. (Administrator D, par. 74)

In brief, the knowledge domain partly shapes teachers' approaches towards collaboration. In the next subsection, facilitators of collaboration are presented.

4.5.2.3 Facilitators of collaboration

Sub-claim 10a: The facilitators of collaboration with the school library that teachers experience are related to the library, librarians, the relationship between teachers and librarians, as well as teachers.

Data about the facilitators of collaboration with the school library as experienced by teachers were only available from teacher questionnaires (Appendix 10, question 12). In interviews, neither teachers nor administrators or students addressed the issue. Table 4-39 shows the facilitators that teachers identified.

Table 4-39: Facilitators of Collaboration

Perspective	Role \ Facilitators related to	Library	Librarians	Relationship teacher-librarian	Teachers	Others
Internal	**Teachers** *(Questionnaire)*	12/26	9/26	9/26	4/26	4/26

Almost half of questionnaire participants (12/26) described facilitators of collaboration related to the library. Seven out of the 12 identified facilitators regarding resources. They wrote, for example, that collaboration is easier when the school has "a library that is well supplied with resources" (QT12, par. 15), that has "print and non print materials" (QT2, par. 15), and "wide ranging databases" (QT8, par. 15). Crucial to teachers is also "the availability" of these resources (QT2, par. 15; QT10, par. 15; QT15, par. 15; QT16, par. 15). Two teachers mentioned aspects related to the space, such as a "big open space" (QT25, par. 15), "location in central campus" (QT25, par. 15), and four aspects related to the accessibility of the library: "availability of the space" (QT15, par. 15), "the library [being] very accessible" (QT18, par.

15), “flexible scheduling” (QT5, par. 15), and “good scheduling for use of facility” (QT19, par. 15). Three teachers noted that good information technology facilities in the library are important.

Nine out of the 26 teachers mentioned enablers related to librarians. Six wrote that the librarians’ welcoming attitude, for example, being “willing to help” (QT14, par. 15; QT18, par. 15; QT1, par. 15), “cooperative” (QT15, par. 15), or even proactive by “reaching out ... to offer suggestions” (QT3, par. 15) enhances collaboration. Three noted that it is important that the librarian has good professional skills, that is, good library and pedagogic skills, for example, Teacher 4 wrote that “librarians ... do an excellent [underlined] job of it here [at Malotha]. Very organized. Excellent handouts and resources” (QT4, par. 15) and Teacher 9 emphasized that librarians need to be “aware of new strategies and techniques, and ... function as much as teachers as they do media specialists” (QT9, par. 15).

Again nine out of the 26 questionnaire participants wrote that the relationship between teachers and librarian could be a facilitator of collaboration. Seven out of the nine stated that a good interpersonal and professional relationship is crucial, which encompasses being “open” (QT19, par. 15), “solid and productive communication” (QT9, par. 15), as well as mutual respect (QT10, par. 15); additionally, Teacher 4 wrote: “Flexibility and understanding on both the teacher's and librarian's parts. Certain boundaries must [underlined, with double line] be respected for a successful collaboration. Different disciplines bring different ideas to the research process. No [underlined] one [underlined] method is supreme” (QT4, par. 15). Common goals and objectives were important for three teachers (QT24, par. 15; QT26, par. 15), with Teacher 5 noting, “Faculty and library must share a common vision and belief” (QT5, par. 17).

Four teachers identified aspects related to teachers, such as valuing team work (QT17, par. 15; QT19, par. 15), having a “general understanding of resources in case librarians are unable to assist” (QT13, par. 15), and knowing what to look for, as Teacher 23 wrote: “Having specific goals for what you are looking for is extremely helpful when working in a library. Without really knowing what information you seek, the library can be very overwhelming” (QT23, par. 15).

Four teachers mentioned other facilitators. From the following statements of two teachers it became clear that programmed research projects facilitate collaboration, writing: “My [subject XY] class last year participated in [BRP11] which was taught by School Librarians. I have not

[underlined] worked with library in other ways" (QT14, par. 13-14), and "Projects that are in place that would parallel what I was attempting to accomplish" (QT3, par. 15). For Teacher 7 the opportunity to use the library as a space with his class "on [his] own" without being forced to collaborate with librarians is important (QT7, par. 15). And Teacher 21 stated that periods for extracurricular activities, such as the two weeks at the end of the school year, "when the time constraints are less oppressive" (QT21, par. 15) could be used for collaboration with the library.

Summary for facilitators

Only teachers reported about facilitators and only in questionnaires; several participants mentioned more than one of them. Almost half of teachers (12/26) wrote about facilitators related to the library and 9/26 questionnaire participants mentioned enablers related to librarians. Again 9/26 teachers noted that the relationship between teachers and librarians could facilitate collaboration. Aspects related to teachers were identified by four educators as facilitators of collaboration; and other facilitators, which were listed by 4/26 teachers, were scheduled research programs (2/4), the possibility to use the library with his class on his own without the librarians being involved (1/4), and periods for extracurricular activities (1/4). In the next subsection, inhibitors of collaboration are presented.

4.5.2.4 Barriers to collaboration

Sub-claim 10b: The barriers to collaboration with the school library that teachers experience are related to librarians, time, teachers, the library, and the relationship between teachers and librarians

Study participants from all groups identified inhibitors that teachers experience regarding collaboration with the school library. They described them as being related to librarians, time, teachers, the library, and the relationship between teachers and librarians. Table 4-40 provides a summary. For this sub-claim, evidence from interviews with administrators and students (external perspective) and from teacher questionnaires and interviews (internal perspective) was available.

Table 4-40: Barriers to Collaboration

Perspective	Barriers related to / Role	Librarians	Time	Teachers	Library	Relationship teacher-librarian
External	**Administrators**	1/4	1/4			
	Students	1 /6 (+4)	4/6	4/6		
Internal	**Teachers** *(Questionnaire)*	10/26	4/26	3/26	11/26	10/26
	Teachers *(Interviews)*	6/11	5/11	5/11	5/11	

Barriers related to librarians

Study participants in all groups reported on aspects related to librarians as inhibitors of collaboration. Six of the eleven interviewed educators did so, with two of them referring to the librarians' lack of subject knowledge; for example, Teacher D mentioned it as the major reason why they could help him only with resources (Teacher D, par. 52). Teacher G noted that he had not collaborated with the librarians (Teacher G, par. 25) much in his teaching anymore because the librarians are too busy with the two scheduled programs in grades 9 and 11. He stated:

> I think they would like to be more helpful, but I think they're very busy, and I don't think they have the time to sit down and really collaborate in terms of setting up research units with the classes that they're not already teaching, you know. I think the library has become much more of a center for the programs that the library has developed and much less a place where teachers will bring their classes. I don't think that happens so much anymore. (Teacher G, par. 51-52)

Four of the six teachers described barriers in the context of extended projects. One of them thought that the librarians tended to give students too much of a direction in the various stages of the process (Teacher H, par. 44) and another one was disappointed because a librarian had directed a student who had asked her for assistance towards a search engine instead of helping him with the databases that the teacher wanted the class to use (Teacher J, par. 110). In the context of BRP11, Teacher I noted that the librarian who acted as project leader had problems

with keeping an overview of due dates so that they would "fluctuate", which was experienced as difficult for students (Teacher I, par. 72).

In questionnaires, 10/26 teachers wrote about barriers related to librarians. Three out of the ten teachers noted that librarians are too busy to collaborate with them, writing, for example: "A staff that is difficult to work with, not having time in the day to collaborate" (QT12, par. 16), "The library is very involved with its own research projects. It is really not that accessible to other disciplines [l.l. anymore]. Not enough ... staff to assist" (QT21, par. 13), and "too few staff to keep up with their own projects and mine" (QT25, par. 16). Other barriers teachers mentioned were "poor communication concerning due dates" (QT5, par. 16), librarians not being up-to-date in their teaching methods (QT9, par. 16), and librarians distracting students; Teacher 7 stated that the "library is very loud and students get distracted by others, including librarians" (QT7, par. 16).

External participants also talked about librarians as barriers to collaboration. Administrator B reported about a small research project in which the teacher was better able to help students to select information within sources because the librarian lacked the subject knowledge needed (Administrator B, par. 63). Student 4 reported about the librarians having difficulties to individually help all students given the high number of students who are doing extended projects (Student 4, par. 224-228); two other students agreed (Focus Group Discussion, par. 229). The librarian who "acted as the grand overseer of the entire project" (Student 2, par. 329) had difficulties keeping an overview of due dates (Student 4, par. 243), which was supported by two other students (Focus Group Discussion, par. 244).

Barriers related to time

In interviews, five out of 11 teachers identified time as a barrier to collaboration. One explanation Teacher B gave for his colleagues' hesitant behavior with regard to collaboration in the scheduled research program in grade 11 was the fact that "it was taking [s.l. them] time" and that they felt that librarians were asking for too much class time (Teacher B, par. 58). Teacher I emphasized that he highly valued BRP11 but he thought it took too long (Teacher I, par. 70). Three teachers reported that finding the time to do research projects within the requirements of an AP course is a challenge; Teacher C and Teacher F reported so for extended research tasks (Teacher C, par. 28-31; Teacher F, par. 47) and Teacher E for small-scale research tasks (Teacher E, par. 102).

In questionnaires, four out of 26 teachers mentioned not having enough time for collaboration. Teacher 5 wrote: “too much time missed from ‘regular’ class (QT5, par. 16); Teacher 17 cited “the test-driven nature of AP courses” (QT17, par. 16); Teacher 18 noted in general terms: “time restraints” (QT18, par. 16); and Teacher 21 explained: “Having a curriculum that is so focused on developing skills leaves little time for independent research. At the HS level, we are strapped for time to accomplish what is basic in our individual disciplines” (QT21, par. 16).

External participants, one administrator and four students, also talked about barriers and problems related to time that teachers experienced in the context of BRP11. The end product is a long research paper, and Administrator B noted that reading and grading such a paper takes much more of the teachers’ time than grading a short test (Administrator B, par. 126). In the focus group discussion, for example, Student 1 described a conversation between the librarian and his teacher at the end of which the latter would not let students go to the library because he needed that particular period to teach his subject (Student 1, par. 259). Student 3 claimed that teachers were under pressure because they had to make sure that students pass their AP tests with excellent scores (Student 3. par. 253-257) and he also found that the class had to do too much work at home for the project because his teacher did not provide enough class time to go to the library (Student 3, par. 242).

Barriers related to teachers

Five educators in interviews reported on barriers that are related to teachers other than just time. For example, Teacher A claimed that information location and evaluation should be taught by the teacher in context because teaching isolated skills does not work; students would forget them easily. He stated:

> I think initially, it comes from teachers because it's taught in a context. I think bringing students down into a library and having someone bring them around and show them how to access databases is fine, is fine. But until they're actually using that information for a purpose, then- That becomes something that may be here today and gone tomorrow. So, I think it comes from- I'm not quite sure, I mean, do I think that it's important for students to learn information location? Yes. Where do I think that comes from? I think it comes from teachers. (Teacher A, par. 72)

And:

> We used to use the term ‘a teachable moment.’ I don't think we use that term anymore. And what it meant was that at any given time, something has either erupted in the

> classroom (an idea, a remark) when the teacher or the student, for that matter, felt it necessary to launch into a greater idea or lesson. And that's where I think this kind of evaluation comes from is when it is germane, when it is relevant to what is happening in any given classroom. (Teacher A, par. 75)

With regard to BRP11 Teacher I stated that "some teachers" could not collaborate with the librarian in such an intense way as others do because they do not only want to remain the main teacher for their students but also the only one (Teacher I, par. 184). Teacher B explained that the lack of support that he identified in some of his colleagues regarding BRP11 resulted in a more hesitant attitude towards the project in him (Teacher B, par. 54-56). Teacher F explained that he did not get involved in BRP11 except for the grading because his help was not needed:

> I mean, I could have gotten more involved, I suppose, if I wanted to, but they didn't need me. The librarians knew what they were doing, and like I say, I would just then be involved at the end, in the grading of the paper. (Teacher F, par. 51)

In questionnaires, three out of 26 participants wrote about inhibitors of collaboration related to teachers, apart from time. Teacher 23 noted that "not knowing exactly what you want" is a barrier to collaboration (QT23, par. 16). Two other teachers stated that working with the library was not necessary in their subject areas, Teacher 15 noting: "The main objective of my course does not require the use of a library" (QT15, par. 16) and Teacher 11 writing: "No need in my field to work with the school library" (QT11, par. 16).

In the context of BRP11, four students talked about their teachers preferring to teach their subject instead of letting the class go to the library. Student 2 explained that his teacher was rather moderate; usually he would easily let students go to the library and only showed some reluctance "sometimes", when he wanted to address a particular issue in class (Student 2, par. 329). Reasons for their teachers' behaviors that other students mentioned were teachers' reluctance to participate in that particular project (Student 3, par. 242), teachers considering it as their role to teach subject content rather than being in the library doing a project (Student 3, par. 253), teachers feeling not respected and experiencing BRP11 as intruding, that is, "cutting into their class" (Student 3, par. 253; Student 1, par. 259), and teachers lacking interest (Student 3, par. 349).

Barriers related to the library

Only teachers reported about barriers related to the library, doing so in questionnaires and interviews. In questionnaires, they were the most important group of barriers with eleven out

of the 26 participants mentioning them. Four of them wrote about barriers due to problems with resources, such as the "availability of materials" (QT19, par. 16), "too few materials – ... books etc." (QT25, par. 16), or "not having immediate access to the source - if the book isn't available or the library doesn't have access to the database, journal, etc." (QT23, par. 16). Again four teachers mentioned barriers in the context of technology, either problems with information technology in the library, such as "access to computers" (QT8, par. 16) or "too few materials – computers" (QT25, par. 16) or, the opposite, the library being unnecessary because of the availability of the internet outside the library. Teachers wrote: "Before internet I would have students go to Library to browse and find books of interest" (QT3, par. 14) and "Overall, I do not use the library that often. Also the students have access to the internet at home" (QT6, par. 17). For another four teachers the accessibility of the library was a barrier, such as scheduling ahead of time (QT6, par. 16, QT13, par. 16) and "moving classes to the library" (QT6, par. 16), "the library not being available during class" (QT12, par. 16), and Teacher 21 wrote: "The library is very involved with its own research projects. It is really not that accessible to other disciplines [l.l. anymore]" (QT21, par. 13). Three of the 11 teachers described barriers with using the library as a space: "not much room to be with class (alone)" (QT25, par. 16), "not enough space" (QT21, par. 13), and "Library is very loud and students get distracted by others" (QT7, par. 16).

For five of the 11 interviewed teachers the reasons that prevented them from collaborating had to do with the library. Teacher J found it difficult to work there with classes because it is too noisy (Teacher J, par. 109). Teacher B noted that the library did not provide the visual sources he needed (Teacher B, par. 172-177) and Teacher F said that books are too quickly outdated and much more recent information is available on the internet (Teacher F, par. 55). Teacher G said that he had not used the library (Teacher G, par. 25) as well as the library computer lab much in his teaching anymore because the library and the computer lab are needed for the two scheduled programs in grades 9 and 11 (Teacher G, par. 43-45; par. 52-56). He also emphasized the advantages of the internet, such as a greater variety of information (Teacher G, par. 29) and students preferring good electronic sources to printed library sources, stating: "I think they're very impressed when they can use college websites and materials that are coming from very valid and very impressive sources and not just a book in a library" (Teacher G, par. 36). He explained that the internet fits better with student thinking: "I just think it's so stimulating, and I think it's moving, it's changing, and I think it works with the way they think" (Teacher G, par. 36) and that they experience a higher motivation and more satisfaction because of faster results:

> I mean it's fast, they get a lot of satisfaction because they find things quickly, and they don't have to read a lot of stuff before they say, "Oh, this is sort of what I need," or "Oh, I found the name or the word that I'm looking for, I found this [information about their topic]" or- I think that their ability to access the information quickly is important for their motivation, to keep their motivation up. I do think that. Just watching ki-. They get discouraged if they don't get a nibble, if they're not finding what they think is what they're looking for, if it takes too long. Let say, you're in a library for a half hour or 40 minutes, if they didn't have a really great source by the end of that time, I think they'd be frustrated, and they wouldn't really wanna do it. (Teacher G, par. 36)

Teacher E also noted that he did not make use of the computers in the library anymore because students could access the internet from home (Teacher E, par. 51) and from any classroom since they bring their laptops to school (Teacher E, par. 81-83). He thought that the internet will replace the library completely in the future:

> You've got the whole world as your library now, with that internet. And I think that's very dramatic. So it's like why stop at the library? If we are really serious about having kids be able to go out and get the information they need, the library is now just one stop, and it's almost like that's just the first step and then go out from there. ... But we don't need this, what I call "brick-and-mortar location" anymore. And I think, as time goes on, we're going to need that less and less. (Teacher E, par. 144)

Barriers related to the relationship between teachers and librarians

Only questionnaire participants, but an important number of them (10/26), wrote about barriers related to the relationship between teachers and librarians. Half of them described problems with the interpersonal and professional relationship: the difficulty to establish a constructive and cooperative relationship with librarians (QT9, par. 16; QT17, par. 16), "lack of collegiality" (QT10, par. 16), "less than desirable collaborative efforts from either party (QT19, par. 16)", and "attitude that they know better than I do" (QT3, par. 16). The other half stated that not having common goals was a barrier to working with the library, writing: "I did feel that it was occasionally difficult to express my goals to librarians - they have their own methods" (QT25, par. 13), "subjectivity; agenda-driven staff" (QT8, par. 16), "Librarians have own agenda and won't listen to goals of the teacher" (QT24, par. 16), "Lack of flexibility. A too-hands-on approach. There are separate jobs involved - facilitator [underlined] (show kids information) and teacher [underlined] (show kids what to do with it, how and why). [l.l. Sticking] to and separating-out those roles is essential" (QT4, par. 16), and "Differing expectations of what the goals (outcomes) of the project should be" (QT26, par. 16).

Summary for barriers

Barriers that teachers experience regarding collaboration were reported by all groups of study participants, that is, by administrators and students (external perspective) and by teachers in questionnaires and interviews (internal perspective). Aspects related to librarians as inhibitors were reported by study participants in all groups, administrators (1/4), students (1/6 and 4 who agreed but could not be identified) and teachers, who did so in questionnaires (10/26) and interviews (6/11). Teachers as barriers to collaboration was reported by students (4/6), who talked about this aspect in great detail in the context of BRP11, and almost half of the interviewed teachers (5/11), but only a low number of teachers in questionnaires (3/26). In the group of administrators no participant reported about it. Participants in all groups reported that teachers experience time as a barrier: administrators (1/4), students (4/6), and teachers in questionnaires (4/26) and interviews (5/11). However, it is qualified as being supported weaker than the two preceding barriers because it was not the second most mentioned in questionnaires (with 10/26 vs. time: 4/26). Barriers related to the library where reported only by teachers, they did so in interviews (5/11) and questionnaires (11/26), in the latter it was the most mentioned. Only questionnaire participants, but an important number of them (10/26) wrote about barriers related to the relationship between teachers and librarians.

4.5.3 Summary for Collaboration

Although they are presented without the precise numbers here, the summarizing statements that follow were closely derived from the data. The majority of Malotha teachers collaborate with the library. In addition to the use of school library resources, which was discussed in 4.3.2, collaboration takes the form of using the library as a space and working with school librarians. More than one-third of collaborating teachers use the library as a space when students undertake research projects and more than half of them work with librarians who either help teachers in the planning phase or become engaged in the actual teaching or both. When they teach students, librarians either act as project leaders or as a support for teachers; there are teachers who attend library sessions whereas others do not. Also, librarians teach classes as a whole and assist students individually.

The three prevalent information literacy categories for which Malotha librarians provide whole-class teaching are first information finding, then information presentation, and afterwards knowledge building. Indications for them addressing the information process, ethical use of information, and information control were considerably less strong. No study

participant reported about librarians teaching classes on how to use information technology. The three predominant information literacy categories for which Malotha librarians provide individual student assistance are first information finding and then, with similar strength of evidence, information presentation and aspects related to knowledge building. Indications for librarians helping students with the process as such and with the ethical use of information were the least strong and no study participant stated that librarians helped students on an individual level with the use of information technology and information control.

Teachers' approaches to collaboration with the school library depend partly on the scope of research tasks. Librarians teach whole classes predominantly in extended research projects and in this context about six information literacy categories, about all except the use of information technology, although to varying degrees. If they teach classes at all in the context of small-scale projects, it is about information finding. Indications that teachers make use of the library as a space especially for working there with classes when students undertake extended research tasks and that librarians help teachers with preparations mainly in the context of small-scale projects were controversial.

The knowledge domain also partly shapes teachers' approaches towards collaboration. In general terms, history teachers are more likely to work with the library in some way or other than their colleagues from the language and science departments. Indications were weak that language teachers are the least likely to use the library as the main room in extended projects but they were strong that librarians are the least likely to get involved in the actual teaching of projects that language teachers assign, regardless the scope. Indications were contradictory for science teachers being most likely to use the library with classes in small projects but they were strong for science teachers being most likely to use the library computer lab when they go to the library with classes outside extended projects.

Other intervening conditions were categorized under facilitators and inhibitors. Facilitators, which were only reported by teachers in questionnaires, were in the first place aspects related to the library, such as the availability of resources in a variety of formats, good information technology, and the easy accessibility of the library in terms of time and space. The two enablers next most mentioned, both to the same degree, were aspects related to librarians, such as a welcoming attitude and good professional skills, and to the relationship between teachers and librarians, such as a good interpersonal and professional relationship as well as common goals. Facilitators identified by a minority of teachers were aspects related to

teachers, including valuing teamwork, being knowledgeable about the library, and goal orientation, and others aspects, such as scheduled research programs, the possibility to use the library with a class without librarians becoming involved, and school-wide periods for extracurricular activities.

Barriers, which were reported by all groups of study participants, were in the first place aspects related to librarians in the sense that they lack subject knowledge, tend to lead students more than teachers want it or towards the wrong sources, do not have time to collaborate with teachers outside scheduled programs such as BRP9 and BRP11, and have difficulties maintaining an overview of due dates in the extended projects in which they take the lead. The next most mentioned barrier were teachers, among others because they do not see the need to work with the library in their subject areas, because they think that information literacy should be taught in context and that teachers are in a better position to do it, because they want to prepare their students well for college by covering as much subject content as possible, because they want to remain the main and only teacher in their classes, or because the reluctance of some colleagues to collaborating with the library enhances their own hesitation. Weaker were indications for the next three groups of inhibitors: time, library, and the relationship between librarians and teachers. Time was a barrier for teachers especially to undertaking extended projects with the library, but in AP classes also to assigning small-scale research tasks; teachers feared they would not manage to cover the whole curriculum. Barriers related to the library were reported only by teachers and they listed the accessibility of the library, problems regarding its space, resources, or information technology and that the internet is replacing the library so that they do not need the library anymore because students have access to the internet from other classrooms in the school building and from home now. Barriers related to the relationship between teachers and librarians were mentioned only by teachers in questionnaires, but by an important number of them, and include the difficulty to establish a good interpersonal and inter-professional relationship, that is, working together in a constructive and cooperative way where the two sides are regarded as equal partners, or failing to define commons goals.

The following, concluding section of this chapter provides an overview of the key findings for the four research questions with an emphasis on the strength of claims and sub-claims.

4.6 Chapter Summary: Overview of Key Findings

The core category "information literacy" with its seven subcategories completion of a process, the use of information technology, information finding, information control, knowledge building, ethical use of information, and presentation of information helped to describe how teachers at Malotha High School teach information literacy. In the previous subsections of this chapter detailed descriptions of findings in the form of claims and sub-claims were presented based on the triangulation of data from interviews with four administrators, including the head school librarian, and the focus group discussion with six students (external perspective) as well as questionnaires completed by 26 teachers and interviews with 11 teachers (internal perspective). This part of the chapter provides an overview of key findings. First those for the process of information literacy teaching at Malotha in general are presented, including findings about teachers' conceptions, then those for intervening conditions. In both sections claims and sub-claims are ranked according to their strength, beginning with the strongest supported and ending with contradictory ones. Exact numbers of study participants from which evidence for a particular claim or sub-claim was available were presented in the detailed descriptions above.

4.6.1 IL Teaching at Malotha

How educators teach information literacy at Malotha is described through their conceptions and practices. First, key findings for the former are presented in terms of teachers' conceptions of an information literate student and of the difficulties students encounter when they undertake research projects (Research Question 1), followed by key findings for practices, which include information literacy competencies covered in the research tasks teachers assign (Research Question 2), as well as teachers' and school librarians' pedagogical interventions (Research Questions 3 and 4). For the four research questions, Table 4-41 provides an overview of the strengths of claims and sub-claims, organized by information literacy categories. The section ends with some concluding statements for the seven information literacy categories.

Table 4-41: IL Teaching at Malotha School by IL Categories (Strengths of Claims)

IL Teaching \ IL categories		Process	IT use	Finding	Control	Knowledge building	Ethical use	Presentation
CONCEPTIONS	Teachers' conceptions of an information literate student	-	+	++	-	+++	-	-
		/	For location of info	Variety! Types: especially web sources	/	Eval-uation: +++ Analysis: ++	/	/
	Teachers' conceptions of student difficulties	0	0	?	-	+++	+++	-
		/	Ease!	/	/	Eval-uation: ? Analysis: +++	/	/
PRACTICES	IL compe-tencies in research tasks teachers assign	+	+++	+++	-	+++	?	+++
		/	Location: +++ Presen-tation: ++	Library: +++ Web: ++	/	Analysis: +++ Eval-uation: ++	/	Written format: +++ Oral format: ++
	Teachers' pedagogical inter-ventions	WC?	-	WC+	-	WC++	-	WC+++
		IA?	IA0	IA?	-	IA+++	IA?	-
	School librarians' pedagogical inter-ventions	-	WC0	WC+++	-	WC+	-	WC++
		-	IA0	IA+++	IA0	IA++	-	IA++

Note. **Signs**: +++ = The best supported aspect, ++ = The second best supported, + = The third best supported, - = Less well supported, 0 = No evidence at all, ? = Contradictory evidence, / = No additional information;

Abbreviations: IA = Providing individual assistance, NA = Not applicable, WC = Doing whole-class teaching

Teachers' conceptions of students as information literacy learners

An insight into teachers' conceptions of student information literacy learning was gained in questionnaires through teachers' descriptions of an information literate student and in interviews through descriptions of their students' difficulties when they undertake research tasks. The most mentioned ability of an information literate student was that of evaluating information, then, and both to the same degree, analyzing information and finding sources. For the latter, participants emphasized the competency to locate sources in a variety of formats, and with regard to specific types the most cited were web sources. The third most mentioned was the competency to use information technology, and especially for information location. Less often mentioned were the abilities to present information, to use information in ethical ways, to control information, and to execute an information process.

The most reported student problems were information analysis as well as ethical use of information. A minority of participants mentioned problems with presenting and controlling information. No teacher talked about problems with the process as such and the use of information technology; for the latter, on the contrary, interviewed teachers talked about students who are good at it, although only a minority of teachers did so. Teachers had contradictory conceptions of students' ability to evaluate and to find information, for both each time a majority said that students had problems but there were also teachers who reported about students being good at them. As far as difficulties with evaluation are concerned, teachers thought that students had them predominantly with evaluating online information.

Information literacy competencies in the research tasks teachers assign

Regarding information literacy competencies covered in the research tasks that teachers assign, the four for which the strongest support was found from educators in questionnaires and interviews as well as administrators and students include: the use of information technology in order to locate information and to a lesser extent also in order to present information; the location of information in a variety of formats, the most mentioned formats being school library sources followed by web sources; knowledge building and in the first place analyzing information in order to develop a personal perspective and in the second place evaluating information; and presenting information, for which the most cited formats were first written and then oral format. There was evidence from teachers only for process and control being part of research tasks, however, the former was better supported (by

questionnaires and interviews) than the latter (in interviews only). Evidence for the ethical use of information was contradictory; students and teachers, the latter only addressed the issue in interviews, reported about it being part of research tasks whereas one of the administrators reported about a project in which the teacher did not require students to document the sources they had used.

Teachers' pedagogical interventions

The majority of Malotha faculty teaches information literacy, and they do it through the assignment of research tasks. In the context of research tasks teachers provide whole-class teaching and individual student assistance and employ a multiplicity of strategies for both.

For whole-class teaching these strategies include presenting analogies, discussions, giving examples, having students do exercises, giving them written handouts, doing lectures, modeling, basing their teaching on skills students developed previously, doing it or making decisions for students. Assessment strategies they use are summative assessment and doing the grading together with a librarian. Regarding information literacy concepts and competencies for which teachers provide whole-class teaching, the three best-supported with ample evidence from administrators or students or both and teacher questionnaires and interviews are first information presentation, then knowledge building, and finally information finding. Only a minority of participants stated that teachers teach their classes about the ethical use of information, about the use of information technology, and about information control, the latter for extended tasks only. No unanimity existed regarding educators teaching their classes to go through an extended research project as a process composed of a sequence of steps; some teach it themselves whereas others leave it to the school librarian.

For individual assistance, which they provide less often than whole-class teaching, teachers use the following strategies: answering student questions, giving students written handouts, asking them questions, reading what students wrote, making suggestions and comments, doing it for students or making decision for them, and formative assessment. The best supported information literacy category by far, for which educators provide individual assistance, is knowledge building; participants from all groups reported about it. Solely interviewed teachers and only a minority of them and only in the context of extended research tasks said that they helped students with information presentation and control. There was no evidence that teachers help students with the use of information technology. The findings for

teachers providing individual assistance with the process as such, information location, and the ethical use of information were contradictory. Regarding information process, teachers in questionnaires and more than half of them in interviews reported about using formative assessment in extended projects, whereas students and a minority of interviewed teachers reported about educators not doing so. For information finding there was evidence from teachers in questionnaires and from more than half of them in interviews that they helped students, but talking about extended projects, one teacher explicitly stated that he felt unable to do so and students also reported about educators not helping them with this particular information literacy aspect. For individual help with ethical use of information about which only teachers talked and only in interviews, three out of 11 said that they helped students whereas another one emphasized that he could not do so.

School librarians' pedagogical interventions

About three-fourths of teachers collaborate with the school library in one way or other. More than one-third of the collaborating teachers use the library as a space when students undertake research projects, and more than half of collaborating faculty work with school librarians either in the planning phase or in the actual teaching. When librarians get involved in teaching, they provide whole-class teaching or individual student assistance or both. Study participants did not provide descriptions of the strategies librarians used in the same detail as they did for teachers.

Regarding information literacy concepts and competencies for which librarians provide whole-class teaching, best supported is information finding with evidence from teachers in questionnaires and interviews as well as administrators and students. The only other two information literacy categories with evidence from the external perspective (administrators and students) and the internal perspective, but for the latter with evidence from teacher interviews only, are information presentation and then to a lesser degree knowledge building. No study participant mentioned that librarians teach students about the use of information technology. Evidence for librarians teaching classes about the three remaining categories, that is, execution of a process, the ethical use of information, and information control, was found in teacher interviews only, and only in a minority of them.

As far as the information literacy concepts and competencies with which librarians help students individually are concerned, best supported is again information finding, the only one for which evidence was found in data from all sources and from teachers in data collected

with both techniques. The next best supported are knowledge building and to the same extent information presentation, the only ones for which evidence was available from the external and the internal perspective. Only a minority of respondents, that is, only a minority of teachers in interviews, mentioned that librarians provide assistance with the process as such and with ethical use of information. No study participant reported about librarians providing assistance on the use of information technology and information control.

Concluding statements for the seven information literacy categories

Students constructing knowledge is crucial for Malotha teachers: evaluating information and analyzing it for developing a personal perspective, both aspects of knowledge building, are among the most important competencies of an information literate student and among the most covered competencies in research tasks. Not only teachers but also librarians teach whole classes about aspects related to knowledge building and help students individually. There was unanimity between educators that analyzing information is particularly challenging for students but controversy regarding students' difficulties with information evaluation.

Teachers think that an information literate student should be able to locate information in a variety of formats, and require students to do so when they assign research tasks. There was no unanimity regarding students' difficulties with this information literacy category. Pedagogical interventions about information location, whether in the form of whole-class teaching or individual assistance, clearly are the librarians' job in the first place. The majority of teachers also provide whole-class teaching about this information literacy category but to a lesser degree than librarians; also, teachers do not necessarily provide individual assistance.

The ability to present information was mentioned by a minority of teachers in their descriptions of an information literate student and students' difficulties. However, information presentation is part of the research tasks that educators assign, mostly in written format. They as well as librarians provide whole-class instruction about it, and the latter also provide individual guidance.

Although the use of information technology, especially for information location, is a competency that a majority of teachers think an information literate student should have developed and that is part of the research tasks they assign, it does not seem to play a major role in whole-class teaching and individual assistance that is provided, neither by teachers nor

by librarians. This is in concordance with the finding that teachers think that students are good information technology users.

The ethical use of information was one of the two most mentioned information literacy competencies for which teachers listed student difficulties but the providence of pedagogical interventions for it was not among the most mentioned, neither for teachers nor for librarians. Also, there were contradictions for teachers helping students on an individual level with this aspect; there are teachers who do it, whereas others do not feel capable. There was also no unanimity about its role in the research projects students undertake; there are teachers who require it whereas others do not.

Although it was not among the most cited in teachers' descriptions of an information literate student and not mentioned at all when teachers talked about students' difficulties, the execution of a research project as a process composed of a number of steps is part of the extended projects that a large number of teachers assign. Findings for educators providing pedagogical interventions, both at class and individual level, about this information literacy category were contradictory, and that librarians provide such interventions was only weakly supported.

Control of information was the least mentioned information literacy category, in teachers' conceptions of students as information literacy learners, in the research tasks educators assign, and in teachers' as well as librarians' pedagogical interventions.

4.6.2 Intervening Conditions

The process of information literacy teaching at Malotha, that is, the information literacy competencies covered in the research tasks which educators assign as well as teachers' pedagogical interventions and their collaboration with the library and librarian, are partly shaped by the type of classes, the scope of research tasks, and knowledge domains. With regard to practices of collaboration teachers experienced numerous facilitators and inhibitors.

Type of classes

Findings from interviews with administrators and students as well as teachers indicate that teachers' decision to teach information literacy partly depends on the type of class. Assigning research tasks to AP classes is particularly challenging for Malotha teachers due to curricular requirements, time pressure, and the school's expectations regarding students' results in

national tests. As a consequence, teachers are less likely to require AP students to undertake research. Instead, elective classes are seen to lend themselves especially well to information literacy teaching.

Scope of research tasks

In Malotha faculty, the primary mechanisms of information literacy teaching are the assignment of small-scale research tasks and extended research tasks. Study participants distinguished between the two types in terms of the time students need to complete them and size of end products so that the following definitions were developed: Extended projects take a month or more to accomplish and result in at least an eight- to ten-page paper, a four-page website, or a 30-minute presentation. All other projects were qualified as small-scale. Findings from interviews with administrators and students as well as teacher questionnaires and interviews indicate that the scope of research tasks shapes information literacy teaching in various ways. Table 4-42 shows the strength of major claims and sub-claims about teaching practices, organized by scope of research tasks.

The scope of research tasks shapes information literacy competencies covered in the research tasks that teachers assign. Strongly supported is that ethical use of information plays a more important role in extended research tasks, and that execution of a research process is part of extended projects predominantly. The support for students controlling information only in extended projects is weaker. There are also differences within information literacy categories. Strong is the support for school library sources, including databases, being the predominant sources in extended and web sources in small-scale projects. Less well supported is that engagement with information in the form of viewing and that presenting information in oral formats happens rather for small-scale research tasks. Findings about analysis for the development of a personal perspective were contradictory: there was ample evidence from teacher questionnaires and interviews that it is part of extended tasks predominantly, but administrators and students reported about it especially in the context of small-scale tasks.

The scope of research tasks also influences teachers' pedagogical interventions. Strongly supported are teachers doing whole-class teaching on the research process as such only in extended projects, providing individual assistance in extended tasks predominantly for knowledge building, and doing more whole-class teaching on information location in the context of small-scale research tasks.

Table 4-42: IL Teaching Practices at Malotha School by Scope of Research Tasks (Strengths of Claims)

Scope of tasks / Teaching practices	Extended research tasks (ERT)	Small-scale research tasks (SRT)
IL competencies in research tasks teachers assign	Differences between IL categories • Ethical use of information predominantly in ERT (+++) • Going through a project as a process composed of a number of steps predominantly in ERT (+++) • Controlling information predominantly in ERT (+)	Differences between IL categories /
	Differences within IL categories • Finding information: School library sources including databases predominant in ERT (+++) • Contradictions for analyzing information in order to develop a personal perspective: Rather in ERT (?)	Differences within IL categories • Finding information: Web sources predominant in SRT (+++) • Engaging with information through viewing rather in SRT (+) • Information presentation in oral formats rather in SRT (+)
Teachers' pedagogical interventions	• Whole-class teaching about the research process as such only in ERT (+++) • Individual assistance predominantly for knowledge building (+++) • More individual assistance (+) • Contradictions for individual assistance with the information process predominantly in ERT (?)	• More whole-class teaching for information finding (+++) • Individual assistance predominantly for information finding (+)
Teachers' collaboration with the school library and librarians	• Librarians teaching classes mainly in ERT (+++) • Librarians covering six IL competencies (all except IT use) in ERT (+++) • Contradictions for using library as a space: Mainly in ERT (?)	• If librarians teaching in SRT, it is mainly about information finding (+) • Contradictions for librarians helping teachers with preparation mainly in SRT (?)

Note. **Signs**: +++ = Strongly supported aspect, + = Weakly supported aspect, ? = Contradictory evidence, / = No claim for this aspect; **Abbreviations**: ERT = Extended research tasks, SRT = Small-scale research tasks

Less well supported are that, talking in general terms, educators help students more on an individual level in the context of extended research tasks, and that teachers provide individual assistance predominantly for information finding in the context of small research tasks.

Findings are contradictory for teachers helping students individually with the process as such predominantly in extended projects.

Teachers' practices of collaboration with the school library and school librarians depend also partly on the scope of research tasks. Best supported are librarians providing whole-class teaching predominantly in the context of extended projects and covering six information literacy categories (all except the use of information technology). Less well supported is that librarians predominantly provide pedagogical interventions for information finding in the context of small-scale projects. Contradictory are findings for librarians helping educators with preparations mainly in the context of small-scale projects (supported by teachers in interviews and administrators but contradicted by teacher questionnaires), and for teachers making use of the library as a space mainly in extended projects (supported by teacher questionnaires and interviews and students but contradicted by administrators).

Knowledge domains

Knowledge domains also shape educators' information literacy teaching. Table 4-43 shows the strength of major claims and sub-claims about teaching practices, organized by knowledge domains. The study took place in a small school and in order to protect the anonymity of participants, only three groups of subjects were distinguished: history, languages, as well as math and science.

There was evidence that information literacy competencies covered in the research tasks that teachers assign depend on the knowledge domain. Strongly supported is that information presentation in visual, electronic, and creative formats tends to be part of projects assigned by history and science teachers rather, and that small tasks assigned by language teachers are more likely to encompass ethical use of information. Weaker was the support for the finding that science teachers expect students to engage with information in a subject-specific way. The findings regarding execution of a process and evaluation are contradictory. There was evidence from teacher questionnaires that history and language teachers are more likely to have students go through extended projects as processes composed of steps but it was not supported by teacher interviews where also science teachers reported about doing so. For evaluation of information administrators stated that all history teachers require it, a claim that was not supported by teacher questionnaires and interviews.

Table 4-43: IL Teaching Practices at Malotha School by Knowledge Domains (Strengths of Claims)

Subjects / Teaching practices	History teachers	Language teachers	Math and science teachers
IL competencies in research tasks teachers assign	• Contradictions: All of them require evaluation of information (?)	• Are less likely to require information presentation in visual, electronic, and creative formats (+++) • In SRT, they are more likely to require ethical use of information (+++)	• Requiring students to use a subject-related reading strategy (as part of knowledge building) in ERT (+) • Contradictions: Are less likely to require students to go through ERT as processes composed of steps (?)
Teachers' pedagogical interventions	• Are more likely to assign research tasks (+++)	• Are more likely to do whole-class teaching about the research process as such in ERT (+++) • Are more likely to provide whole-class teaching and individual guidance about ethical use of information (+)	• Are less likely to provide individual assistance about information finding in ERT (+++) • Are more likely to do whole-class teaching about IT use (+) • Contradictions: Are less likely to provide individual assistance about the process as such in ERT (?)
Teachers' collaboration with the school library and librarians	• Are more likely to collaborate with the library (+++)	• Librarians doing less teaching for them (+++) • Are less likely to use the library as main room for ERT (+)	• Are more likely to use the library computer lab with classes in SRT (+++) • Contradictions: Are more likely to use the library with classes in SRT (?)

Note. **Signs**: +++ = Strongly supported aspect, + = Weakly supported aspect, ? = Contradictory evidence;
Abbreviations: ERT = Extended research tasks, SRT = Small-scale research tasks

Differences depending on knowledge domains were also found in teachers' pedagogical approaches. Strong was the support for history teachers being more likely than their colleagues to assign research tasks, both small-scale and extended, language teachers being more likely to provide whole-class teaching about the process as such when students undertake extended projects, and math and science teachers being less likely to help students

individually with information finding in extended research tasks. Weaker is the support for language teachers being more likely to provide pedagogical interventions, both on class and individual level, about the ethical use of information and math and science teachers being more likely to do whole-class teaching about the use of information technology. Contradictory were findings for math and science teachers being less likely to provide individual assistance about the process as such in the context of extended projects (all interviewed language and history teachers provided assistance, but there was no unanimity among science teachers).

The knowledge domain also influences the way in which teachers work with the library and librarians. Strongly supported are the following findings: talking in general terms, history teachers are more likely to collaborate with the library; language teachers tend to provide pedagogical interventions about information literacy on their own so that librarians do less whole-class teaching and individual guidance for them than they do for history as well as math and science teachers; in the context of small-scale research tasks, math and science teachers are more likely to make use of the library computer lab with their classes than their colleagues. Less well supported is that language teachers are less likely to use the library as the main room for extended research tasks. Contradictory are findings for math and science teachers being more likely to use the library with classes in the context of small-scale projects (supported by teacher questionnaires, contradicted by teacher interviews).

Facilitators and inhibitors of collaboration

For teachers' collaboration with the school library and librarian other intervening conditions in the form of facilitators and inhibitors were identified. Table 4-44 gives an overview of the strength of their evidence.

Table 4-44: Facilitators and Inhibitors of Collaboration (Strength)

	Facilitators	**Inhibitors**
Teachers' collaboration with the school library and librarians	• Library (+++) • Librarians (++) • Relationship teacher-librarian (++) • Teachers (-) • Others (-)	• Librarians (+++) • Teachers (++) • Time (+) • Library (+) • Relationship teacher-librarian (+)

Note. Signs: +++ = The best supported aspect, ++ = The second best supported, + = The third best supported, - = Less well supported

Only teachers reported about facilitators and only in questionnaires. Enablers related to the library were the most mentioned, then, and both to the same extent, those related to the librarian and those related to the relationship between teacher and librarian; of lesser importance were facilitators regarding the teacher and other facilitators.

Barriers that teachers experience regarding collaboration were reported by all groups of study participants: administrators and students (external perspective) and teachers in questionnaires and interviews (internal perspective). The two for which the most evidence was found were first teachers experiencing aspects related to librarians as inhibitors and then aspects related to teachers. The other three inhibitors, which are time, the library, and the teacher-librarian relationship, were of less importance and supported to the same extent.

This chapter reported the findings of the present case study, first in the form of a detailed description for each of the four research questions, followed by an overview of key findings. They were presented in the form of claims and sub-claims, for which evidence from the external perspective (administrators, including the head school librarian, and students) and internal perspective (teacher questionnaires and interviews) were compared and contrasted as well as that within the two perspectives. The next chapter interprets and discusses these findings.

5. Interpretation, Discussion, and Conclusions

5.1 Chapter Overview

The purpose of the present qualitative investigation, which used a case study design, was to gain an in-depth understanding of the process of teaching information literacy in a high school faculty, and to develop a theory that was grounded in the data, based on the analytical procedures suggested by Corbin and Strauss (2008). The following research questions guided the study:

1. What are teachers' conceptions of student information literacy learning and learners?
2. What information literacy competencies, if any, are encompassed in the research tasks that teachers assign?
3. Which pedagogical interventions, if any, do teachers use when they teach information literacy?
4. How do teachers work with the school library and school librarians, if at all, when they teach information literacy?

Data were gathered through semi-structured individual interviews with four administrators (including the head school librarian), a semi-structured focus group discussion with six students, questionnaires with predominantly open-ended questions completed by 26 teachers, and semi-structured interviews with 11 teachers. In addition, documents and informal conversations provided data about the context.

The previous chapter presented in detail the findings for each research question separately and ended with an overview of key findings. The limitations of the study were addressed in detail in Chapter 3, section 3.7. The present chapter interprets and discusses the findings in the light of their context (as described in Chapter 3, section 3.3) and the literature (as reported in Chapter 2), and discusses their implications for other settings in general and in Germany in particular. The chapter ends with suggestions for further research and reflections about the overall significance of this study.

5.2 Interpretation of Findings in Their Context

This section interprets the findings of the present study in the light of their context, that is, at the macro level, the information age, and, at the micro level, the specific characteristics of Malotha High School and its library (as described in Chapter 3), and draws conclusions for this setting.

It seems to be a reaction to the information age, described by them mainly in terms of the availability of huge amounts of information and easy access to it through the web, that the majority of Malotha educators perceive student information literacy learning as important and actually teach information literacy. In this context, there was evidence of a dichotomy: on the one hand, teachers repeatedly stated that students risk to suffer from information overload but, on the other hand, student ability to control information was among the least mentioned in all areas, that is, teachers' conceptions of an information literate student and of student difficulties, information literacy competencies in research tasks, whole-class teaching and individual assistance provided by themselves or by school librarians. Malotha educators design the curricula for their subjects on their own, and apart from the three compulsory research programs there is no formal school-wide information literacy policy or curriculum. As a consequence, there is a risk that students are provided ample opportunities to develop particular competencies, especially the use of information technology, information finding, evaluation, analysis, and presentation, as well as completion of extended projects as processes composed of various steps, repeatedly and in great detail, whereas others may be neglected, such as information control and the ethical use of information.

The findings showed another discrepancy: although Malotha School adopted a strong plagiarism policy, and although it was one of the most mentioned in their descriptions of student difficulties, the ethical use of information does not seem to be part of the teaching priorities of Malotha teachers. Only a minority of teachers mentioned the ability to document sources in their description of an information literate student. It does not seem to be a natural component of the research tasks that teachers assign; findings were contradictory at this point. Only a minority of teachers provides whole-class teaching or individual assistance about it, and as far as the latter is concerned, there are teachers who do not feel able to do so. Only a minority of participants reported about librarians teaching classes and helping students individually with this information literacy category. It would be an oversimplification to conclude that ethical use of information is not important to Malotha teachers. Rather, it seems

to be of great importance to a limited number of them, especially language teachers, and maybe the other subject teachers tend to rely on their colleagues from the language department for the teaching of this information literacy competency.

Malotha School is very much concerned about offering teachers and students good and state-of-the-art technological facilities. Also, teachers are expected to embed information technology into their teaching and are supported in their endeavors to do so by a Director of Technologies. The ability to use information technology for information location and to a lesser extent also for presentation is among the four most-mentioned information literacy competencies in the research tasks teachers assign, it is the third most-mentioned in their descriptions of an information literate student, but neither teachers nor librarians provide much whole-class teaching or individual assistance. One reason may be that teachers perceive of students as better information technology users than they are themselves and as being so good that they do not need any further help. Another reason could be that neither teachers nor librarians are able to provide the support students would necessitate. There is a need for Malotha teachers and librarians to keep up-to-date their own information technology literacy and their pedagogical knowledge and skills regarding this information literacy category. The school expects its staff members to model lifelong learning through regular participation in in-service training; maybe this would be an opportunity. Another challenge for the library is the wireless coverage, which was available at the time of study in most of the school's classrooms. Students are allowed to bring their mobile devices and to use them in the classroom setting, so that teachers do not necessarily need the library computer lab when their students undertake small-scale research tasks and the library as a brick-and-mortar location risks becoming dispensable. Librarians cannot be expected to be the information technology leaders in their school, but given the prevalent role of web sources in small-scale research projects, the type of research task assigned by the highest number of teachers, librarians should be prepared for a change in their role, and be ready to help teachers and students with a variety of hardware and software, though not to the same extent as information technology professionals with whom they should closely collaborate.

Malotha teachers are rather traditional in terms of the presentation formats they require students to employ, with the two prevalent formats being first written and then oral. But there are differences between subject groups, for instance, history as well as math and science teachers tend to be more open to the use of visual, electronic, and creative formats. Also, Malotha teachers seem to address information presentation with the class as a whole in the

first place, where they tend to impose particular formats rather than letting students decide. A major challenge for them could be to foster student independence in this area, for example, through the assignment of tasks that are authentic and meaningful not only in the sense that they are related to students' out-of-school lives and have the potential to enhance student motivation but also in the sense that they are destined and presented to an audience that is different from teachers, librarians, or peers.

Pedagogical interventions about information location at Malotha are not only provided by librarians. Teachers also provide whole-class teaching about this information literacy category, maybe despite the fact but probably rather because of the fact that the library is well-staffed. At the time of study, the presence of two certified MLIS professionals supported by a library assistant and an intern allowed a higher number of collaborative activities to take place and with more teachers so that the latter could learn from librarians how to teach information location on their own. As far as individual assistance is concerned, approaches vary in the faculty: There are teachers who help students with this information literacy category whereas others leave it up to the library specialists. Similarly, pedagogical interventions about knowledge building are not only the responsibility of teachers but Malotha librarians are also highly involved. For this information literacy the findings showed a high level of congruence: Teachers perceive aspects related to knowledge building, that is, especially evaluating and analyzing information in order to develop their own perspective, as the most important abilities of an information literate student, and in line with this, they as well as librarians provide pedagogical interventions both at the whole-class and individual level for them.

The scope of research tasks shapes teachers' pedagogical interventions, for example, those for information location and knowledge building: In the context of small tasks teachers teach classes and help students predominantly with information finding and in extended tasks they provide individual assistance rather about competencies related to knowledge building. Although expository teaching is important at Malotha, the vast majority of teachers require students to engage actively with information and the information environment through the assignment of research tasks, partly extended in scope, among these are the three scheduled grade-wide programs in grades 9, 10, and 11, but predominantly small-scale. The findings clearly showed that teachers do address information literacy through these short tasks. This type of tasks allows students to develop and practice skills and concepts that they need for successful completion of extended tasks. A major advantage of small-scale tasks is that they

can be applied, also spontaneously, for supporting the whole range of teaching approaches, from the most objectivist to the most constructivist approach, and for requiring students to delve deeper into subject content, either in the class setting or beyond. From the perspective of Malotha teachers, both types of tasks, extended and small-scale, should be considered as complementing each other rather than competing with each other.

The culture at Malotha School is particularly favorable towards information literacy teaching and collaboration between teachers and librarians: The enhancement of critical thinking is one of the major objectives mentioned in the school's mission statement; teachers are expected to foster information literacy in all courses, and the term is explicitly used in the school's documents; the school has a strong tradition in research and writing; the school offers programs of extended research in grades 9, 10, and 11; and teachers have workloads that are limited in terms of the number of hours and classes, and they are expected to collaborate with their colleagues. The presence of a well-equipped and well-staffed library situated in the center of the school also enhances information literacy teaching. At the time of study, about three-fourths of the Malotha faculty had already worked with the library; such a high number would be hardly imaginable if teachers had to bring their classes to a (public or academic) library outside the school campus somewhere in the community. The prevalent role of library resources in extended projects would be hardly imaginable without the selection of high-quality sources, and especially databases, that are available in the school's library and accessible 24 hours a day, 7 days a week. But the findings showed that even under such favorable circumstances there are differences in information literacy teaching between classes. Teachers tend to assign research tasks in elective or regular classes rather than in AP classes. This seems to be a result, at least partly, of the school's high expectations regarding student achievement in standardized tests, which, at the time of study, were still emphasizing subject knowledge in the form of memorized facts rather than in the form of the ability to locate subject-related information in sources in a variety of formats and to use it for knowledge construction.

The relationship between teacher and librarian was perceived by educators as an important facilitator but also as an inhibitor of collaboration. Another barrier, which was experienced by teachers who wanted their help for small-scale tasks, was Malotha librarians' intense engagement in the two extended research programs in grades 9 and 11. The high number of collaborative activities with teachers and the variety in their faculty's actual information literacy teaching approaches are considerable challenges for Malotha librarians. They need

the ability to understand and accept diversity, including diversity regarding types and scope of research tasks as well as subjects. They need the readiness to consider and practice information literacy teaching as a shared responsibility. They need the ability to train teachers, for example, through modeling and formal or informal professional development so that they become able to help students develop information literacy. And they need the ability to deal with a multiplicity of expectations and personalities. As far as the extended projects in grades 9 and 11 are concerned, maybe an even higher level of long-lasting teacher support in terms of active readiness to participate and active engagement could be achieved, if the librarians, who are the project leaders, could enhance the sense of ownership in the teachers towards these projects.

The next subsection takes a more distant and broader approach and interprets the findings of the study at Malotha based on the literature.

5.3 Interpretation of Findings Based on the Literature

The findings of the present investigation are compared and contrasted in this section to previous studies and major definitions, models, and theories of information literacy or collaboration, which were described in more detail in the literature review in Chapter 2. It begins with a discussion of the findings about teachers' conceptions of student information literacy learning (Research Question 1), followed by an interpretation of the findings about information literacy competencies in the research tasks teachers assign together with the findings about pedagogical interventions teachers use for teaching information literacy (Research Questions 2 and 3). The section concludes with a discussion of the findings about teachers' collaboration with the school library and librarian (Research Question 4).

5.3.1 Teachers' Conceptions of Student IL Learning

This subsection interprets the findings for the first research question about teachers' conceptions of student information literacy learning based on the literature. In concordance with other research (Eickelmann & Schulz-Zander, 2008; Probert, 2009; Williams & Wavell, 2007; Saunders, 2012; Weetman, 2005; Weetman DaCosta, 2010), the present study showed that teachers do think about student learning of information literacy and that they consider it important. Other findings did not confirm previous research in the same manner. On the next pages, similarities and differences with the literature are first discussed for the findings about

teachers' conceptions of an information literate student and then for those about teachers' conceptions of student difficulties. Afterwards the information literacy conceptions held by the participants in the present study are compared to those described in Bruce's (1997) model and finally differences between the information process concept in this study and Kuhlthau's (2004) model of the information search process are discussed.

Teachers' conceptions of an information literate student

Malotha teachers perceived of an information literate student, firstly, as one who is able to evaluate information, secondly, as one who can locate information in a variety of sources and analyze it in order to develop a personal perspective, and, thirdly, as one who is able to use information technology, especially for information location.

The prevalence of information evaluation at the expense of information finding in teachers' conceptions has not been systematically reported by other researchers. Williams and Wavell (2007) found that secondary teachers understood information literacy at the beginning of the study predominantly as the location of information and that they gained a broader and deeper understanding of information literacy only as the study progressed, that is, after having been exposed to information literacy definitions, models, and frameworks. Moore (1999), Probert (2009), and Herring (2010) also reported about teachers holding a conception of information literacy predominantly as being related to information location. But in line with the present study, Purcell et al. (2013) found that, when ratings of "essential" were considered, teachers ranked the item about information location only sixth in a list of eight when they were asked about important skills for students' future lives; ranked first was an item related to evaluation of information. However, it should be emphasized that the majority of participants in the study undertaken by Purcell et al. were teaching high-performing students, that is, AP, honors, or accelerated classes, a fact that might have shaped the findings. And the present study took place in a school with a well-equipped school library that has a strong information literacy program centered on knowledge building rather than information finding, which also may have influenced teachers' conceptions. As far as the ability to use information technology is concerned, similar to this study, Probert (2009) reported about teachers mentioning it second in their descriptions of an information literate person.

Teachers' conceptions of student difficulties

Other researchers found that teachers, if they do it at all, tend to observe student information literacy rather informally (Probert, 2009; Williams & Wavell, 2006a). Teachers' reports of

students' difficulties in the present study were based partly on their interactions with students in the context of research tasks and partly on formal assessment, especially when students undertook extended projects. Differently from Moore's (1999) participants, the teachers in the present study did not identify problems in all steps of a research process, for them students encounter difficulties predominantly with regard to the ethical use and analysis of information.

As far as students' problems with the ethical use of information are concerned, Purcell et al. (2013) reported that students' ability to use information in an ethically sound way was among the ones that were considered by the majority of teachers as "fair" or "poor". As far as students' difficulties with analysis of information are concerned, considerably more studies reported it as being an information literacy competency considered by teachers as the one that is the most challenging or as one among those that are the most challenging for students (Gordon, 1999; Ladbrook & Probert, 2011; Merchant & Hepworth, 2002; Williams & Wavell, 2006a). Not totally in congruence with these, between 50-60% of participants in Purcell et al.'s (2013) study described their students' competencies of taking into account multiple viewpoints, synthesizing them, and building a strong argument as being at least good; but the majority of these educators were teaching high-achieving students so that findings might have been different for descriptions of regular or lower-performing students.

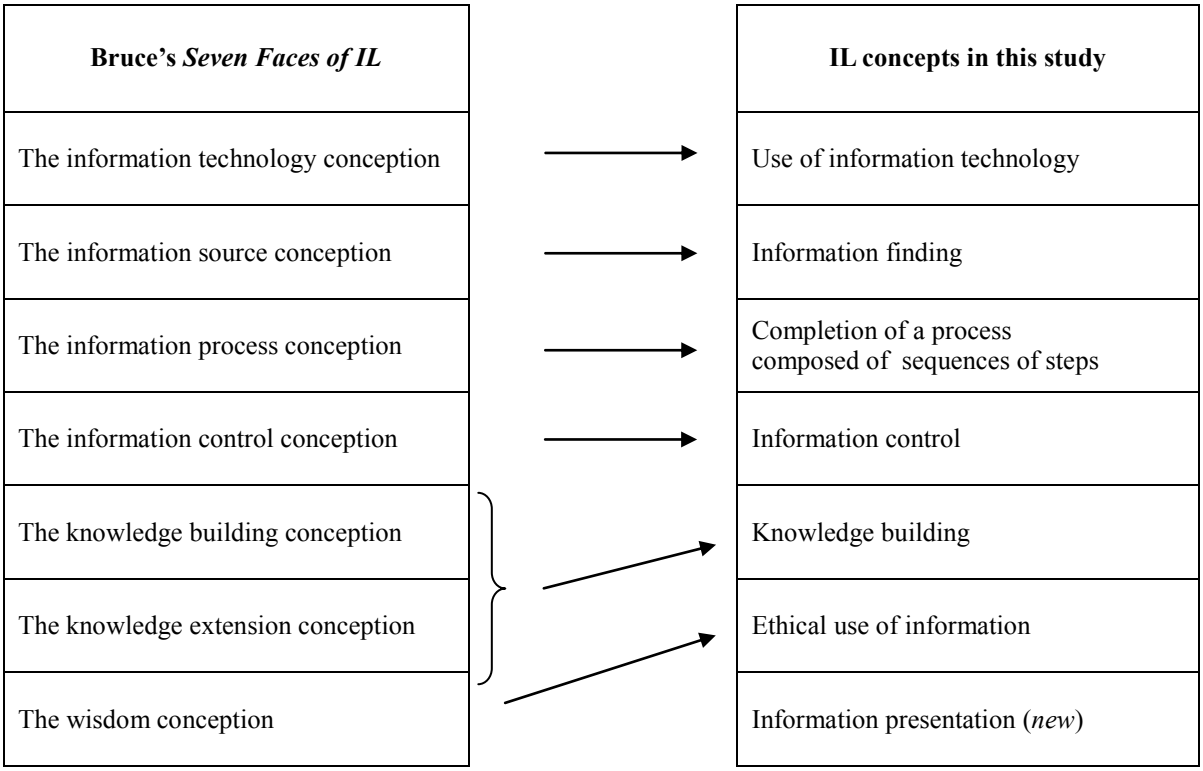
In other studies it was found that teachers think students have difficulties especially with evaluation of information (Merchant & Hepworth, 2002), are good information technology users but have problems with information evaluation (Ladbrook & Probert, 2011; Williams & Wavell, 2006a), and are better locators than evaluators of information (Breiter, Welling, & Stolpmann, 2010; Purcell, Buchanan, & Friedrich, 2013). These trends were only partly confirmed in the present study: Teachers also reported about students being good in their handling of information technology but they had divergent conceptions of students' abilities to locate and evaluate information.

Comparison to the information literacy categories in Bruce's model

As explained at different points in this report (for example, in subsection 3.6.2.1), the information literacy conceptions as described in Bruce's (1997) model were utilized as a sensitizing framework during the analytical process. They were employed with an open stance and allowed to evolve during the process. Her categories are described in detail in subsection 2.3.1.1, a summarizing description of the information literacy categories that emerged out of

this study is provided in Appendix 17; this subsection analyzes the differences between them and Figure 5-1 provides an overview.

Figure 5-1: Comparison of IL Concepts in Bruce's Model and in This Study



Bruce's *information technology conception* (C1) became the category *use of information technology* with two major differences occurring: First, the participants of this study had a narrower view regarding the use of information technology for communication, referring to it, as is not untypical in the school context, as using technological tools for talking about a topic to an audience rather than using technological tools for exchanging information back and forth with others. Second, Bruce's information technology conception includes the notion of random information scanning as a decisive element, which was not shared by the participants of this study who, instead, discussed primarily goal-orientated searches. Bruce's *information source conception* (C2) was renamed *information finding* in this study but in terms of content both are similar. Her *information process conception* (C3) became the category c*ompletion of a process composed of sequences of steps* and is different in the sense that the information need or knowledge gap based on which a person is supposed to initiate an information process is artificially imposed on students by teachers rather than naturally experienced by students. Bruce's *information control conception* (C4) also kept its name; however, different from the participants in her study participants of the present study did not address it on a general level

in the sense of storing information in such a way that its retrieval on need is facilitated but on a more specific level as storing in an organized way the information collected and produced in the context of a particular research task assigned by a teacher. Also, unlike Bruce's participants those who took part in the present research did not explicitly refer to the strategy of using the human brain for storing information. Bruce's *knowledge building conception* (C5) and her *knowledge extension conception* (C6) were combined under a category labeled *knowledge building*. The latter is different from the two former in the sense that the field or area in which students build new or extend existing knowledge are, depending on the approaches to topic selection, more or less rigidly imposed by teachers, and regarding extension of knowledge, that prior knowledge and experience were regarded by the majority of study participants as crucial whereas intuition was not seen as playing an important role. Bruce's *wisdom conception* (C7) changed considerably, first, in terms of its content and, consequently, in terms of its name, becoming the *ethical use of information* in this study. Wise use in the sense of employing information for the benefit of others was not part of participants' conceptions. What was retained from Bruce's conception were the importance of values when information or knowledge as presented by other authors is used and in this sense also the notion of social responsibility. However, ethical use of information was referred to by participants not solely but especially in terms of documenting sources. Finally, a new conception emerged in this study: *information presentation*, partly in the form of intermediate products at different points during a research process or as a final product at the end. Student presentation of knowledge plays an important role in the school context, as it typically serves as a basis for assessment.

Execution of a process as compared to Kuhlthau's Information Search Process

From a library perspective, Kuhlthau (1989; 2004) investigated what students experienced when they were searching for information, and, based on constructivist learning theories, she described it as a process of building new knowledge; her model, *The Information Search Process*, was described in detail in section 2.2.1.1. In the present study, teachers described extended research projects as more or less linear sequences of interrelated steps. For them, student knowledge building and the development of their own perspective were a crucial part of research tasks but they perceived of the step-by-step process as separate from knowledge building. They considered the steps as playing a structuring role and providing students with a scaffold. A reason may be that study participants did not necessarily hold a predominantly or radical constructivist view of learning and that they did not necessarily perceive of student

independent information searching as a prerequisite for knowledge building. Faculty, at least partly, valued cognitive processes and gave students the time to think critically with and about the information they gathered so that it cannot be argued that step-by-step approaches do by definition exclude knowledge building.

5.3.2 Teachers' Practices of IL Teaching

This subsection discusses, based on the literature, the findings for the second and third research question. First, the finding that the majority of Malotha educators teach information literacy is compared to previous studies, then the pedagogical strategies employed by them, followed by the information literacy categories for which pedagogical interventions are provided, and the types of sources used by students when their teachers assign research tasks. The subsection concludes with a comparison of the intervening conditions found at Malotha to the literature.

The majority of faculty teaching information literacy

On a general level, results from other studies are contradictory for the question of whether educators do actually teach information literacy to their students or not. There are reports about teachers who teach information literacy (Breiter, Welling, & Stolpmann, 2010; Lance, Rodney, & Russell, 2007; Lance, Rodney, & Schwarz, 2010; Latham & Gross, 2008; Purcell et al., 2012). Other researchers found that educators do not teach information literacy at all, not explicitly, or that students were not satisfied with the assistance they had received from their teachers with research tasks (Merchant & Hepworth, 2002; Moore, 1999; Probert, 2009; Ladbrook & Probert, 2011; Smith & Hepworth, 2007). As far as precise numbers are concerned, in studies with participants from across schools or institutions, Smith (2006a) reported that slightly more than 50% of teachers had integrated standards of information literacy and information technology into their subject teaching. At tertiary level, Saunders (2012) found that almost 80% of faculty had addressed information literacy concepts in their teaching and in his investigations within two different institutions, Weetman (2005; 2010) found that slightly more than 50% and 60%, respectively, had explicitly taught information literacy.

Quantitative results from questionnaires at Malotha showed that close to 80% of faculty had addressed information literacy with their classes. However, for the qualitative part it was not possible to find any teacher who belonged to the 20% who had written that they had not

taught information literacy at all. Those who were identified by the key informants or other interview participants as being included in this group and considered themselves as being part of it, were found, during the interview, to teach information literacy in some way or other. Major conclusions are that educators teach students more about information literacy than they are aware of, and that they, at least partly, do not do it deliberately or explicitly, and, also, that they are rather unfamiliar with the concept of information literacy. Teachers may play a more important role for enhancing student information literacy than they have so far been entitled to play by the LIS profession. Also, the high level of information literacy teaching within the Malotha faculty may be partly due to the presence of a well-equipped library run by a well-trained and highly motivated head librarian who, supported by an engaged team, has been particularly active in this area and from whom teachers may have learned how to teach information literacy on their own.

Pedagogical strategies for teaching information literacy

In concordance with findings of other studies, this investigation showed that the primary mechanism for teaching information literacy is the assignment of research tasks, and that teachers typically address information literacy at the whole-class and individual level (Birmingham et al., 2008; Purcell, Buchanan, & Friedrich, 2013). A frequently reported strategy, which is utilized in both situations, is teachers doing things or making decisions for students: Researchers reported about teachers pre-selecting and locating sources and information for students (Asselin & Moayeri, 2008; Merchant & Hepworth, 2002; Williams & Wavell, 2006a) and directing students towards or not allowing them to use specific sources or formats of sources (Purcell et al., 2012; Purcell, Buchanan, & Friedrich, 2013; Williams, Grimble, & Irwin, 2004). Similarly, the teachers in the present study searched and evaluated sources for students or decided on presentation formats.

Doing part of information processes for students, limiting student freedom of choice by setting clear parameters and directing students towards them tend to be important approaches taken by teachers. Reasons may be that teachers think these approaches help students, ensure quality, save time both for preparations as well as in the classroom, and make sure that all students have the opportunity to develop skills and knowledge in the same area. Two major implications can be deduced from this: First, in order to guarantee high quality, teachers need to be information literate themselves when they accomplish (part of) information processes for their students. Second, if it appears to teachers as unrealistic and even impossible to cover *all* curricular topics through extended inquiry units during which students, based on their own

interest, prior experiences and knowledge, and in collaboration with peers or external experts search information in a variety of formats about a topic of their choice and build new knowledge about it, guided by the teacher and librarian, then it is crucial that teachers at least vary in their teaching approaches and do not exclusively transmit information but also provide enough opportunities for guided inquiry learning. The findings of the present study clearly indicate that Malotha teachers do so. More arguments for using a variety of teaching approaches rather than persisting on one of the extremes for addressing information literacy are brought forward by education scientists and researchers.

Ausubel (1968) argues that both expository and discovery teaching can lead to rote and meaningful learning; crucial are the conditions of learning. He is a strong proponent of expository teaching as it best serves the needs of "the *non*-exceptional child" (emphasis in original) (Ausubel, 1964, p. 302). He considers inquiry or discovery learning as being well-suited "for the exceptional child" (p. 302) and notes that "discovery has its proper place among the repertoire of accepted techniques available to teachers" as long as it is not used routinely but only "for certain purposes and under certain conditions" (p. 290).

In terms of teaching approaches, Clark, Kirschner, and Sweller (2012) distinguish between *direct, explicit, full instructional guidance*, for example, in the form of lecturing, modeling, through video or computer-based presentations, and *partial, minimal instructional guidance*, for which they list as examples discovery learning, problem-based learning, inquiry learning, experiential learning, and constructivist learning. They argue that "the past half century of empirical research has provided overwhelming and unambiguous evidence that, for everyone but experts, partial guidance during instruction is significantly less effective and efficient than full guidance" (p. 7). The major reason is that humans' working memory is limited in its capacity for dealing with novel situations but can use the organized information stored in the long-term memory for dealing with situations about which some knowledge has already been gained. They suggest to make use of full and explicit instructional guidance for novice to intermediate learners, and to utilize partial or minimal instructional guidance only for the most expert learners.

Hattie (Hattie, 2009) compares *active instruction*, during which "teachers are key agents in all the interventions" (p. 243) and which include, for example, direct instruction, frequent testing, meta-cognitive strategies, to *facilitative instruction,* during which teachers provide minimal guidance, and for which he cites, for example, inquiry-based teaching, problem-based

learning, and individualized instruction. From his synthesis of meta-analyses he concludes not only that the first "is much more effective" (p. 243) than the second but also that "the more direct and active methods of teaching appear to be optimal for achieving ... learning" as described in constructivist theories (p. 244).

Helmke (2007) emphasizes that students vary considerably in their personalities, learning styles, abilities, motivations, behaviors, and achievements so that educators need to be able to employ a variety of teaching methods in a pedagogically justified, competent, and flexible but not arbitrary way. Therefore, teachers should alternate between strategies that enhance expository and discovery learning as well as between strategies that foster teacher-directed and independent student learning (pp. 65-70).

Based on these arguments, the findings at Malotha, and variation theory, it is concluded that information literacy should be taught in multiple and differing ways. Bruce is one of the proponents of variation theory and together with Edwards and Lupton (2006) she offered the following conceptual framework for information literacy teaching that consists of six "frames": a discipline-related "content frame", a behavioral or performance-oriented "competency frame", a constructivist "learning to learn frame", a "personal relevance frame" oriented towards experiences, a "social impact frame" oriented towards social reform", and a "relational frame", centered on students' experiences with their information environment.

Information literacy categories for which teachers provide pedagogical interventions

As far as information literacy categories are concerned, for which teachers provide pedagogical interventions, the findings of this study show the following predominant patterns: Teachers use strategies of whole-class teaching predominantly, first, for addressing information presentation, second, for addressing the building of new knowledge from the located information, and, third, for addressing information finding; teachers utilize strategies of individual assistance in the first place for aspects related to knowledge building. Purcell et al. (2012, 2013) found that the majority of educators spent class time for discussions with students, first, about the ethical use of information and evaluation of online information, and, second, about successful online searching. The most notable difference between the two studies is that Malotha teachers tend to address the ethical use of information to a lesser extent than the teachers who participated in the other study. As noted above (in section 5.2), it would be an oversimplification to conclude that ethical use of information is of no importance to Malotha teachers. Findings indicated that it is of great importance to a limited number of

them, especially language teachers, and it might be that teachers of other subjects tend to leave the teaching of this particular information literacy category to their colleagues from the language department.

Information literacy teaching at Malotha is partly though not totally in concordance with the current version of the AASL *Standards for the 21st-Century Learner* (2007) although these were neither mentioned explicitly by study participants nor were any other signs of their application by teachers found in the data. The standards are described in detail in section 2.2.1.2. They clearly emphasize critical thinking and knowledge building, also priorities of Malotha teachers. Similarly, knowledge sharing or presentation is also well covered by Malotha teachers, whereas ethical and productive participation in a democratic society do not seem to be among their priorities. For the second it was found that although, in the context of research tasks, social interaction of students with peers and adults within the classroom or school setting is fostered, there were only weak indications that it was somehow connected to the community, as required in the standards. The majority of teachers stressed personal growth as an outcome of research processes in their teaching of information literacy whereas aesthetic growth, as outlined by the standards, was fostered only by a minority of them.

Use of sources when students undertake research

Several studies investigated the types of sources students would use for completing the research tasks teachers assign. Purcell et al. (2012) found that, according to educators, students would make use of online sources in the first place, that is, search engines, free online encyclopedias, social media sites, and news sites, followed by study guides, for example, SparkNotes or CkliffNotes. Textbooks would also be important as well as peers, but students were said to be considerably less likely to rely on library sources, including the librarian, databases, and printed books other than textbooks. The study undertaken by Williams et al. (2004) in a US school also showed that teachers require their students to use internet sources more often than the librarian, the library catalog, or electronic databases. The findings from these studies were partly confirmed at Malotha in the sense that school library sources, including databases and books other than textbooks, are the predominant sources in extended projects and web sources prevalent in small-scale projects. A study undertaken by Williams and Wavell (2007) in the UK found that teachers perceived of information literacy as being related to the use of physical and electronic but not human sources. It was not

confirmed at Malotha where teachers, though a minority, explicitly mentioned students' use of human sources.

The intervening nature of length of teaching and knowledge domains

Slight indications were found in the literature for teachers' conceptions of information literacy teaching or their self-assessment of it being shaped by their age or the length they have been teaching (Arenz, Huth, & Pfisterer, 2011; Lance, Rodney, & Schwarz, 2010). The present study could not support these. Much stronger were the indications both in the literature and in the present study about the influence of subjects or knowledge domains on teachers' information literacy teaching although there were differences in terms of the type of the influence. The findings of this research that history teachers are the most likely to assign research tasks is not in concordance with Purcell et al.'s (2013) results according to which English teachers tended to assign more such tasks than history/social studies teachers and were the ones who were the most likely to assign them at all as compared not only to teachers from the history/social studies department but also to those from the science and those from the math departments. A similarity with the study realized by Purcell and colleagues is that English teachers, or, in the present study in more general terms language teachers, are the most likely to offer class teaching about the ethical use of information.

Arenz et al. (2011) reported about language teachers having less positive attitudes towards the use of digital media in their teaching and being less likely to agree that students' computer use has a positive impact on their learning. Mainly in concordance with them, the present study found that language teachers were the least likely to require students to present information in visual, electronic, and creative formats and that language teachers, together with their colleagues from the history department, were less likely than math and science teachers to provide any whole-class teaching about the use of information technology. However, a third study, which was undertaken by Williams and Coles (2000), contradicted the findings. Their study included another group, that is, one of business and management teachers, and the two researchers found that math and science teachers closely followed by language teachers hold more negative attitudes and made less use of information technology in their teaching than business and management teachers.

The comparison of the studies shows that information literacy teaching is partly different from one subject department to another but also that these differences need not necessarily be related to the subject or knowledge domain as such. Discrepancies in teaching about

information technology, for example, could also be a related to personal interests of individual teachers or the presence of an information technology leader in one department.

5.3.3 Teachers Working with the School Library and Librarian

In the present study, the majority of faculty was found to have had collaborated with the school library or librarians in some way or other. This subsection first compares the findings about teachers' use of the library as space to previous studies, then those about teachers' collaboration with librarians and the latter's role in these collaborative activities. Afterwards, on a more general level, teacher-librarian interaction at Malotha is compared to the three types frequently discussed in the LIS literature, that is, cooperation, coordination, and collaboration, and to the four facets in Montiel-Overall's (2008) model. The subsection ends with a comparison of the intervening conditions that emerged out of the present investigation to former research.

Teachers visiting the library with students

This study found that more than one-third of faculty uses the school library as a space when their classes undertake research projects. No other study that reported numbers for this type of activity and for a single school could be found. But school library impact studies, for example, the three in Indiana (Lance, Rodney, & Russell, 2007), Idaho (Lance, Rodney, & Schwarz, 2010), and Pennsylvania (Lance & Schwarz, 2012) reported results about class visits to the library, separately for librarians and teachers. Taking all studies together, between 27.4% and 36.5% of librarians reported no or rare fixed library visits and between 2.1% and 19.3% of librarians reported no or rare flexible library visits; each time slightly more than one-quarter of teachers reported about visiting the library with classes never or seldom on a fixed schedule and 14.7% to 21.5% of teachers stated that they do not or rarely visit the library with classes on a flexible schedule. These impact studies showed that teachers have a preference for using the library on a flexible schedule, a finding not confirmed by this study where teachers mentioned scheduled research programs as a facilitator of collaboration. The present study also showed that not all teachers attend library sessions together with their classes. It confirms the findings of the three impact studies, in which 16.0% to 32.2% of librarians reported that teachers never or rarely accompany their students to the library and 15.9% to 32.8% of teachers reported about doing so not at all or seldom.

Working with librarians and librarians' roles

The present study also found that more than half of teachers work with librarians. A frequently reported activity was Malotha librarians helping teachers with preparations of research units, for example, through the provision of sources or ideas or both. The role of the librarian as a provider of resources for teachers was also studied in the impact studies in Indiana (Lance, Rodney, & Russell, 2007) and Idaho (Lance, Rodney, & Schwarz, 2010); librarians proactively providing sources for instructional purposes or teachers asking for them were the most reported activities by teachers in the two studies and by librarians in Indiana. In another impact study that took place in the state of New York (Small & Snyder, 2009), teachers ranked providing resources to teachers and students and keeping a well-organized collection as the second and third most important services offered by school librarians. The findings at Malotha confirmed that the librarian's traditional role of providing sources is important to teachers but also that, at this school, librarians go beyond and participate in teaching.

Collaboration on instruction was part of the studies in Indiana (Lance, Rodney, & Russell, 2007), Idaho (Lance, Rodney, & Schwarz, 2010), and Pennsylvania (Lance & Schwarz, 2012) and, again, findings were reported for librarians and teachers separately. Considerable differences between states were found but findings from librarians as compared to those from teachers were consistent within states; no or rare collaboration was reported by 14.0% to 32.9% of librarians and by 19.2% to 48.1% of teachers. The Kent study (Todd & Heinström, 2008) about the dynamics of teacher-librarian interaction found differences between teachers' expected gains and the actual gains reported by them: They hoped that students would learn to the same degree both subject content and research skills but teachers noted that the collaboration had actually contributed to students' learning of research skills in the first place. The qualitative part of the New Jersey study (Todd, Gordon, & Lu, 2011) showed that in school libraries that are highly effective, librarians help students to develop capabilities not only related to reading and engaging with resources but also regarding active engagement in thinking processes for building knowledge, the mastery of subject content, management of learning, and other personal and interpersonal capabilities, for example, the ethical use of information. Malotha librarians were found to be engaged in the majority of these areas, although to varying degrees.

The impact studies in Ohio (Todd & Kuhlthau, 2005b), Delaware (Todd & Heinström, 2006a; Todd & Heinström, 2006b) and Wisconsin (Smith, 2006a) investigated in which areas

teachers' perceive of the library as most helpful for students. Findings were similar in all three studies: Teachers considered the library as most helpful for students with finding information and using information technology and as least helpful with the development of subject knowledge, academic achievement, and independent learning. In concordance with these studies, the present investigation showed that Malotha librarians provide teaching at the whole-class and individual level in the first place for information finding. But different from these studies, the present study showed that Malotha librarians are also actively involved in the teaching of aspects related to student knowledge building: They provide individual assistance and, to a lesser extent, also whole-class teaching about them. Another difference compared to the findings in these impact studies was that Malotha librarians do not seem to provide pedagogical interventions about the use of information technology. Given the frequent use of information technology for information location and presentation by students in the context of research tasks and the increasing importance of digital tools in general, a major challenge for Malotha librarians is to keep up-to-date with recent technological developments and their use for educational purposes and to become more actively involved in the teaching of the competencies related to them.

The aforementioned study in the state of New York (Small & Snyder, 2009), also reported that teachers considered librarians' engagement for enhancing students' ethical use of information as less important, ranking it third lowest on a list of ten items. This may be an explanation for why Malotha librarians were not reported to be highly involved in the teaching of the ethical use of information. It may be that teachers, as they do not perceive of librarians' engagement in this aspect as being particularly important, do not give librarians the opportunity to address it with students.

Types of collaboration

On a general level, several studies found that librarians and teachers tend to work together especially in informal and loose cooperations, to a lesser extent in more formal coordinations where they plan together but do the teaching independently, and least in the form of collaborations where they plan and teach units together as equal partners (Todd, 2005b; Todd, Gordon, & Lu, 2010; Todd, 2012; Small, Shanahan, & Stasak, 2010). Making different use of these terms, Montiel-Overall (2005b, 2005a, 2008) developed a research-based model according to which high-level teacher-librarian collaboration that has an impact on student learning of subject knowledge as well as information literacy includes the following four facets: coordination, which does not require much commitment and is aimed at efficiency in

the first place; cooperation, for which teachers and librarians define similar or joint goals, split tasks, and the librarian acts as a support for the teacher; integrated instruction, that is, integration of the library program with subject curricula, which requires shared thinking and planning, allows participants to create together something that they could not have achieved individually, and the librarian acting as a co-teacher; and integrated curriculum, which means integrated instruction in the whole school, with all subjects. At Malotha, as far as information literacy is concerned, the first three types of librarian-teacher interaction were found. Also, the collaboration tends to be more intense with some subjects than with others, which is discussed in more detail in the next paragraphs. A major challenge at Malotha would be to expand the integrated information literacy instruction to other subjects, ideally based on an explicit information literacy curriculum that takes into account subject-related differences and ensures that all students in all grades and subjects are provided with regular and varying opportunities for developing the information literacy concepts and competencies needed to enhance their learning of subject content.

Intervening conditions

The findings of the present investigation showed that teachers' use of the library and their collaboration with librarians is partly shaped by knowledge domains. History teachers were found to be the most likely to collaborate with the library in some way or other, language teachers appeared to be the least likely to make use of the library as a space in extended projects and librarians were the least likely to do any teaching for them, and science teachers were the most likely to make use of the library computer lab with classes for small-scale research tasks. Hence, the present study is not in concordance with previous research according to which language arts teachers are the most likely to engage in collaborations with librarians, closely followed by social studies teachers and later also by science teachers, and according to which math teachers are by far the least likely to do so (Todd, 2005b; Todd, Gordon, & Lu, 2010; Todd, 2012). It could be a particularity of Malotha School that language teachers are not collaborators as frequently as reported in other studies but more research in other schools is needed for verifying this claim. However, it might be that language teachers consider it as their own rather than the librarians' responsibility to teach students about information literacy. Or, they feel themselves well-trained for providing pedagogical interventions about research tasks so that they simply do not see the need for asking librarians to get involved as much as their colleagues from other departments. Other reasons are discussed on a general level in the next paragraph based on the literature.

Facilitators and inhibitors of collaboration

Kuhlthau (1993b) emphasizes that facilitators and inhibitors of librarian-teacher collaboration are not necessarily opposites. Similarly, the present investigation found partly different enablers and barriers, and for factors that belong to both groups differing degrees of importance.

Facilitators found to be crucial in the present study are first, the library, second, librarians, and, third, the relationship between librarians and teachers. They have also been found to be important enablers in other studies: The availability and easy accessibility of a well-equipped and well-functioning library in studies undertaken by Kuhlthau (1993b) as well as Todd and Heinström (2006b). Attributes related to the librarian such as a friendly and welcoming attitude and good professional skills in Haycock's meta-synthesis (2007), and research undertaken by Montiel-Overall (2008) and Todd together with Heinström (2006b). The relationship between teachers and librarians in the sense of good communication, good team dynamics, mutual respect, and shared goals in the aforementioned studies undertaken by Kuhlthau (1993b) and Montiel-Overall (2008), another study undertaken by Todd and Heinström (2008) and a study by Williamson et al. (2010).

The two prevalent inhibitors of collaboration in the present investigation are, first, librarians, and second, teachers. Aspects related to the latter as reasons for non-collaboration with librarians or with other teachers such as not seeing the necessity to collaborate with librarians or a hesitating attitude towards new media were found by Todd and Heinström (2006b) and Eickelmann together with Schulz-Zander (2008). A major difference between the present and previous research is that at Malotha time was identified as a barrier but was not the predominant one. It was identified as a crucial barrier by Kuhlthau (1993b), Gordon (1999), and Probert (2009). For the teachers in Todd and Heinström's (2008) study, time was the prevalent initial concern, the most important difficulty met in the planning phase as well as during the actual collaborative teaching, and the predominant barrier to continued collaboration. A major conclusion is that librarians might be more important for teachers' decision to collaborate than was thought; this may be experienced by LIS professionals as a burden but should be taken in the first place as an opportunity.

This section compared the findings of the study at Malotha to the literature; the next section discusses their implications for practice.

5.4 Implications for Practice

The present study used a qualitative approach so that findings cannot be generalized, but based on the detailed description of their context they can be transferred to other settings (Guba, 1981; Miles & Huberman, 1994). This section begins with a discussion of the implications of the findings for other settings on a general level followed by one for settings in Germany.

5.4.1 For Other Settings in General

Three major implications for other settings in general are discussed in this subsection: librarians getting help from teachers, the role of small-scale research tasks in information literacy teaching, and the use of the seven information literacy categories that emerged out of this study as a tool for evaluating information literacy initiatives at various levels.

Librarians getting help from teachers

Although teachers were not familiar with the term information literacy, the present study clearly showed that the majority of them offered students opportunities for developing information literacy and provided pedagogical interventions about them, and that the school's library and librarians played an important role. Also, teachers were found to teach students more about information literacy than they or the librarians were aware of. Major implications are, first, that teachers need to be more explicit about the underlying concept of information literacy or whatever the term is they want to use, second, that librarians should not perceive themselves as the only ones responsible for information literacy teaching in the school context, and third, that ideally the two professional groups should agree on common understandings of the concept.

Teachers being more explicit about the skills, abilities, and concepts related to students' engagement with information that they cover with their classes requires the awareness and the definition of an overarching concept, which could but does not have to be labeled information literacy. They need to be more explicit about their information literacy teaching to themselves as well as to their colleagues, including librarians. Teachers being explicit to themselves is crucial for ensuring deliberate rather than arbitrary information literacy teaching, and being explicit to librarians facilitates collaboration.

School librarians do not need to carry alone the burden of teaching all concepts and competencies related to information literacy to all students across courses and grades, as teachers are helping. Librarians are the information literacy experts; however, teachers are per se in closer contact and more frequent interaction with students, and they decide on learning objectives and activities, including those regarding student engagement with information. Librarians can get involved in part of these activities only and, as the study showed, a high and intense level of interaction with some teachers in extended research tasks may be perceived by other faculty members as a barrier to library use and collaboration. Instead of entering in a competition about information literacy teaching, librarians should value teachers' initiatives and offer their support. They should be ready to collaborate with teachers in various ways, that is, helping them through informal coordination and slightly more formal cooperation, and acting as co-teachers in integrated instruction (Montiel-Overall, 2008), modeling information literacy teaching, and providing professional development, but they should also strive to stay in good terms with those teachers in their school who neither want nor need their help.

The study confirmed that mutual understanding and respect as well as shared goals and objectives are regarded by teachers as facilitators of collaboration with librarians. Therefore, finding common understandings and agreeing upon a terminology regarding skills, abilities, and concepts for students' interaction with information within a school, taking into account subject-related differences and, as emphasized by Limberg (2006), the characteristics of each particular school, is a major challenge but also a prerequisite for successful faculty-librarian interaction. Teachers and librarians also need to keep in mind that the ultimate goal should be enhancing student learning and their personal growth rather than fostering information literacy, or whatever the term may be, for its own sake.

The role of small-scale research tasks

The present study showed that small-scale research tasks play an important role in teachers' professional everyday reality; they are their prevalent mechanism for addressing information literacy. Teachers' pedagogical interventions and their interaction with the librarian are partly shaped by the scope of research tasks, and so are the information literacy competencies covered. In small-scale tasks students use especially online sources and viewing as a type of engagement with information as well as information presentation in oral formats happen with this type of task predominantly,. Small-scale research tasks are opportunities for students to

develop a whole range of concepts and cognitive skills. Not only extended but also small-scale tasks require thinking, for example, when sources or information within them need to be evaluated or the main ideas extracted, and given the rather tight time frames for this short type of tasks, often at a high pace. However, inherent, especially though not solely, in small-scale tasks is the danger that students are encouraged to collect facts and to simply copy and paste found information. It is the teachers' and librarian's responsibility to give students the time needed for engaging in the thinking processes that are necessary for building knowledge and developing their own point of view.

The seven information literacy categories as a tool for evaluating information literacy initiatives

The study found that those teachers who teach students about information literacy and work with the school library and librarians in this context do so for the following seven categories: executing a research project as a process composed of a sequence of steps, using information technology, finding information, controlling information, building knowledge, using information in ethical ways, and presenting information. They can be used for evaluating information literacy initiatives. Librarians can use them, ideally together with principals and teachers, for identifying information literacy initiatives at the whole-school level and as a basis for developing a school-wide information literacy program. The first part of a tool for evaluating extended research projects (ERP), called *ERP Overview*, is proposed in Table 5-1. Based on the findings at Malotha School, the ERP Overview distinguishes between extended research projects that are typically assigned every school year (*scheduled ERP*) and other extended research projects that are assigned in one school year but not necessarily in another year (*additional ERP*). This broad, list-type part of the tool is meant to gain a first overview of extended projects and the information literacy categories that either the librarian or the teacher or both together teach students. It is supplemented by a second part (called *ERP Details*) that collects the particularities of each single extended research project (Appendix 23), that is, the objectives of the project related to the subject and to information literacy (for each of the seven categories separately), the pedagogical interventions and strategies, and the role of the teacher and the librarian.

Both parts of the tool can be used retrospectively, for the evaluation and improvement of information literacy activities, but also prospectively, for their preparation. They can be utilized, as noted above, at school level but also at an individual level. Teachers can employ

them for establishing which information literacy category they cover during a particular school year in their research assignments and in their pedagogical interventions both those for whole classes and those in the form of individual student assistance. The ERP Details help teachers to find out which information literacy categories are emphasized and maybe even overemphasized, and which are taken into account to lesser degrees or even missing. Librarians can make use of the tool in a similar way for evaluating their own information literacy teaching, for example, their initiatives for a given grade level during a particular school year.

Table 5-1: Evaluation Tool. IL Categories Taught in Extended Research Projects (ERP): Overview

School year:						**Information literacy categories taught by the teacher and/or librarian***						
ERP	**N°**	**Teacher**	**Grade/ Class**	**Subject**	**Unit**	**Execution of a process**	**Use of IT**	**Info finding**	**Info control**	**Knowledge building**	**Ethical use of info**	**Presentation of info**
SCHEDULED	1											
	2											
	3											
	4											
	5											
	...											
ADDITIONAL	1											
	2											
	3											
	4											
	5											
	...											

Note. ERP = Extended research project;

*The information literacy categories explicitly taught by the librarian and/or teacher in a particular ERP should simply be checked (X) at this point

The study showed that teachers also evaluate and assess student information literacy formally, especially when students undertake research projects and particularly extended tasks. The *Student IL* form presented in Appendix 24 shows how the seven information literacy categories can be used in this context. It helps to identify the concepts and competencies, for each of the seven information literacy components separately, developed by a particular student in (all) the extended research projects that he has been assigned. In addition, it provides the opportunity to make comments about the student's strengths and weaknesses. The Student IL form can be completed at the end of a project by the teacher and/or librarian or by the student together with the teacher and/or librarian in an evaluative session. If the form is completed systematically at the end of each research project, it can be employed for identifying how a student's information literacy concepts and competencies evolve throughout the school year. If appropriate storage can be maintained over a longer period of time, for example, as suggested by Kuhlthau et al. (2007), in the library, the form can be used at the beginning of the following school year for identifying the information literacy concepts and competencies students bring with them and as a basis for longitudinal assessment that provides cumulative evidence about changes in information literacy concepts and competencies of individual students over several years.

Tertiary educators can use the framework when they teach information literacy and pedagogical skills and knowledge related to it to future librarians and teachers. The framework could help to raise future librarians' and teachers' awareness of the complexity and encompassing nature of skills, abilities, and concepts related to the engagement with information.

5.4.2 For Settings in Germany

This subsection discusses implications of the present study for settings in Germany, first regarding information literacy teaching without the existence of a well-equipped school library in the school building, then regarding the prevalence of the concept of media literacy in the German education sector.

Teaching information literacy without a library and librarian in the school building

This study confirmed that the existence of a library and the presence of a librarian within the school building are important for information literacy teaching, especially when students undertake extended research tasks. When they undertook this type of tasks, students made use

predominantly of library sources, especially databases, and librarians provided pedagogical interventions for six information literacy categories (all except the use of information technology). German students are assigned extended research projects repeatedly during their school career and in several states also as one of the requirements for graduating from high school, but the majority of schools do not have a well-equipped and well-staffed library (Schlamp, 2013, p. 20; Schuldt, 2006, p. 14). In addition, important barriers to collaboration as perceived by German teachers are the distance to librarians in the public service hierarchy (librarians being typically found on a lower level than teachers) and the tendency of librarians to address information literacy teaching from the perspective of the library rather than from the perspective of students and teachers (Schlamp, 2013).

As long as a library and/or librarian within the school building are missing, external (public and academic) librarians in the community can offer support, even if they will not be able to teach permanently and over weeks or months all the classes that would need it and cannot provide individual assistance to all students who would need their help and in the same intensity as librarians within the school building. However, for overcoming the aforementioned barriers, librarians should build on the facilitators identified in this study. Teachers appreciate easy access to high-quality sources, so that external librarians should emphasize sources which are accessible online, especially databases, and offer access to them from within the school building. Similarly, external librarians should conduct the respective trainings for teachers and students in the school building rather than in the external library. Teachers appreciate a relationship with librarians characterized by mutual respect, common goals, and flexibility. Hence, (external) librarians need to develop objectives of information literacy teaching together with teachers. When their activities related to information finding have been successful, (external) librarians should participate in the teaching of the other information literacy concepts and competencies, including those related to knowledge building and the use of information technology.

Because external librarians can never replace a librarian inside the school and as long as the latter is missing, German teachers need to be particularly well prepared for providing the pedagogical interventions that are necessary when they expect their students to engage with information in extended research projects.

Combining information literacy and media literacy

The study showed that teachers are not familiar with the concept of information literacy. In Germany, the concept of media literacy is more commonly used in education (Homann, 2008, p. 96). Several of the categories identified during this study partly intersect with definitions of media literacy, for example, the use of information technology, finding information in a variety of formats, evaluation of information, the ethical use of information, and information presentation. Others tend to be more specifically related to information literacy, for example, execution of research tasks as processes composed of sequences of steps, controlling information, and, in particular, building subject knowledge from the found information. As a consequence, combining both concepts under a broader term abbreviated *MIL,* standing for *media and information literacy* as done by numerous authors (Balceris, 2011; *Bibliothek und Information Deutschland*, 2011; Gapski & Tekster, 2012b; Lux & Sühl-Strohmenger, 2004; Schiefner-Rohs, 2012; UNESCO, 2011; Wilson, Grizzle, Tuazon, Akyempong, & Cheung, 2011; UNESCO, 2012), seems appropriate. However, the label is secondary; crucial is that teachers, ideally together with school librarians, help students to develop and expand the abilities, skills, knowledge, and concepts they need for engaging actively with their information environment, including digital participatory communities, so that they can learn successfully and grow personally throughout their whole lives.

After these suggestions for practice, the next section offers recommendations for future research.

5.5 Suggestions for Future Research

This study was among the first to investigate the process of information literacy teaching in an entire faculty and, on a general level, more research about teachers should follow. For several of the claims about Malotha teachers' conceptions of student information literacy learning as well as about their practices of information literacy teaching and collaboration with the school library evidence was contradictory (Table 4-41, Table 4-42, and Table 4-43). Based on these ambiguous claims as well as the limitations of the study as discussed in section 3.7, suggestions for future investigations are offered in this section, first for their designs and afterwards for the areas they should cover.

5.5.1 Regarding Research Designs

In order to gain an in-depth understanding and to cope with the complexity inherent in information literacy teaching in a faculty, it was decided to undertake the present study in a single school. For strengthening and refining the theory that was developed, it needs to be tested in other settings, ideally with other faculties as a whole but also with individual teachers and in different types of schools, for example, in other independent schools but also in public schools. Other researchers (Lance, Rodney, & Russell, 2007; Smith, 2006a; Todd & Heinström, 2006b; Todd, Gordon, & Lu, 2010; Todd, 2012) reported differences regarding librarian-teacher collaboration between school grade levels; the present study was undertaken in a high school, further studies should include elementary and middle schools. Teachers' perspectives on and practices of information literacy teaching and their collaboration with the school library and librarians in this context are relatively new research areas (Gapski & Tekster, 2009; Lance & Schwarz, 2012; Lance, Rodney, & Russell, 2007; Montiel-Overall, 2010; Probert, 2009; Todd, 2005b; Williams & Wavell, 2006a). Consequently, in a first phase, more studies using a qualitative approach should be undertaken, which allows investigators to gain a deep understanding and knowledge by exploring a phenomenon from the participants' perspective (Corbin & Strauss, 2008; Merriam, 2009). More qualitative case studies should be undertaken, but action research is also a well-suited method as it can enhance participants' motivation to participate. Techniques should include, without being limited to, semi-structured individual interviews or focus group discussions, document analysis, participant diaries, and onsite observations or, alternatively, video observations if teachers can be found who agree to participate. Afterwards, when a solid theory has been developed from these qualitative studies, in a second phase, it should be tested in quantitative approaches, for example, using the survey method and within it techniques such as applying questionnaires with mainly closed-ended questions to large, randomly selected samples, or highly structured, standardized interviews.

5.5.2 Regarding Research Areas

This subsection makes recommendations for clarifying in further investigations the claims for which contradictory evidence was found at Malotha (Table 4-41, Table 4-42, and Table 4-43), first, regarding educators' conceptions of student difficulties, then, for information literacy competencies covered in research tasks followed by educators' pedagogical interventions, and, finally, for their collaboration with the school library and librarian.

Teachers' conceptions of student difficulties

There was no unanimity regarding Malotha teachers' conceptions of student competencies for information finding and evaluation, for each of the two there were teachers who stated that students were good at them whereas others identified student problems. Also, this divergence among teachers is not in line with the trend identified in other studies (Breiter, Welling, & Stolpmann, 2010; Purcell, Buchanan, & Friedrich, 2013) that teachers think students are better locators than evaluators of information. Students experiencing difficulties can be a reason for teachers to provide pedagogical interventions so that it is crucial to establish more clearly where teachers think students are good regarding information location and evaluation and where they think students have difficulties. In addition and on a more general level, it would be important to investigate how teachers assess student information literacy learning, if they do it at all.

Information literacy competencies in research tasks

Other contradictions were found in terms of information literacy competencies covered in the research tasks teachers assign. More research is needed for clarifying if and to what extent the ethical use of information is part of the research tasks teachers assign. As far as differences based on the scope of research tasks are concerned, information analysis for developing a personal perspective was mentioned predominantly but not only in the context of extended research projects. It should be investigated how it is part of small-scale tasks. As far as differences between subjects are concerned, some of the participating math and science teachers required their students to complete extended projects as processes composed of a sequence of steps whereas others did not; overall, it could not be clearly established if math and science teachers are less likely to do it than their colleagues from other departments. More research is needed for understanding under which circumstances this particular group of teachers requires students to execute extended research projects as processes and what these processes encompass. Evaluation of information as required by history teachers when their students undertake research also needs verification. It should be studied in more detail if they are more likely to do so than their colleagues from other departments, which types of sources and information they ask students to evaluate and according to which criteria, and to what extent both types of information and evaluation criteria differ from those employed by teachers from other departments.

Teachers' pedagogical interventions

Findings at Malotha School were ambiguous for whole-class teaching and individual assistance offered by teachers for the completion of a research project as a process composed of a sequence of steps, and for individual assistance provided by them for information finding and the ethical use of information. There are teachers who provide pedagogical interventions in these areas whereas others leave it to librarians or simply do not do it. Further investigations are needed for understanding in more detail under which circumstances teachers want, ask, or maybe only allow librarians to provide pedagogical interventions to their students and, as far as teachers are concerned who provide the interventions themselves, how they do it.

Other claims for which findings were contradictory and which need clarification are that teachers, regardless of the subjects they teach, provide individual assistance with research processes predominantly in the context of extended tasks and that math and science teachers are least likely to do so. There were teachers at Malotha who referred to small-scale research tasks as processes so that, before clarification is sought regarding the aforementioned claims, it needs to be investigated in more detail how teachers distinguish between extended and small-scale research tasks and in what terms teachers perceive of short-scale projects as processes.

Clear for Malotha was the finding that history teachers are more likely than their colleagues from other departments to assign research tasks but it was in divergence with previous research that reported English teachers being the most likely to do so (Purcell, Heaps, Buchanan, & Friedrich, 2013). More investigations are needed for understanding the dynamics regarding the assignment of research tasks within knowledge domains and within schools.

Teachers' collaboration with the school library and librarian

Regarding teachers' use of the library more research is needed for clarifying if teachers tend to make use of the library as a space mainly for extended research tasks, and if math and science teachers are more likely than their colleagues to make use of the library when their classes undertake small-scale tasks. Regarding teachers' collaboration with librarians it should be verified if and in which ways librarians help teachers with preparations mainly in the context of small-scale research tasks. But more importantly, for both areas, teachers' use of

the library as a space and their interaction with librarians, it needs to be further investigated to what extent they are shaped by knowledge domains, as the findings at Malotha School that language teachers were least likely to make use of the library as a space in extended projects and librarians were the least likely to do any teaching for them were in contradiction with previous studies (Todd, 2005b; Todd, Gordon, & Lu, 2010; Todd, 2012). One direction could be to explore in more depth how group dynamics within a faculty and within departments shape teachers' collaboration with the library.

A scientific study typically raises new questions but first of all it answers questions. The answers to the research questions in the present study as described and explained in detail in this report contribute to the field of information and library science in significant ways.

5.6 Overall Significance of the Study

The present investigation was among the first to study information literacy teaching as practiced by teachers and their interaction with the school library and librarian in this context not only with frequent collaborators but an entire faculty. In Germany, the proponents of a library and a well-trained, certified school librarian within the school building are supported by the findings that school library sources are prevalent in extended research projects and that school librarians provide pedagogical interventions not only for information finding but for the majority of information literacy components, including knowledge building, when students undertake extended projects. On a general level, the finding that the vast majority of teachers also provide pedagogical interventions about information literacy has the potential to change practices of (school) librarians and reminds the LIS profession that it is crucial to include teachers when information literacy courses, programs, curricula, including spiral curricula, which are widespread in Germany, are developed. This study also showed that information literacy teaching in formal education is a highly complex endeavor: Teacher-librarian collaboration just as information literacy competencies covered in research tasks and teachers' pedagogical interventions about them can take multiple forms which vary partly depending on the scope of research tasks and subjects. If librarians want to play a major and maybe even leading role in information literacy teaching, they need to take into account this complexity. When two individuals with different professional backgrounds and expectations work together, knowledge about the other is required; this study contributed to librarians' discovery of the world of teachers.

Appendix 1. Informed consent form for administrators

INTERVIEW: INFORMED CONSENT FORM

Title of Study:	***Classroom Teachers' Conceptions and Practices of Information Literacy Teaching***
Principal Investigator:	*Nathalie Mertes, Ph.D. Candidate, Berlin School of Library and Information Science, Humboldt University, Germany*
Co-Principal Investigators:	*Prof. Dr. Konrad Umlauf, Berlin School of Library and Information Science, Humboldt University, Germany* *Prof. Dr. Ross J. Todd, Rutgers, The State University of New Jersey, US*

Dear ...,

You are invited to participate in a study designed to gain a deeper understanding of classroom teachers' conceptions of, and practices in, the teaching of effective location, evaluation and use of information. The study is being conducted as research towards a doctoral dissertation.

Data will be collected through a questionnaire on Professional Development Day, through interviews and from documents.

You are invited to take part in an interview that will last between 45 and 60 minutes. The questions relate to student learning, teaching and collaboration with the school library.

This research is confidential. Your name will not be associated with the findings in any way, and only the investigator will know your identity. In published reports and conference presentations, group results will be presented and any illustrative quotations that are used will not enable you to be identified. All study data will be stored securely.

Before you agree to participate, you should know enough about the study to make an informed decision. Do not hesitate to ask questions about the study before or during the interview. Please feel free to contact me during my onsite visits or via email at n.mertes@student.hu-berlin.de, or to contact my faculty advisors, Prof. Dr. Konrad Umlauf at konrad.umlauf@ibi.hu-berlin.de and Prof. Dr. Ross Todd at rtodd@rutgers.edu .

Your participation in this study is voluntary. You may choose not to participate, and you may also choose not to answer any question with which you are not comfortable.

There are no costs involved in participating in this research, and you will receive no compensation. The research presents minimal risk - for example, loss of the time it takes to participate in the interview. However, the information you provide will lead to increased knowledge about teachers' conceptions and practices regarding the teaching of information location, evaluation and use. I would be happy to share the findings with you after the research is completed.

Thank you for your time and for your contribution.

A copy of this consent form will be given to you for your records.

Write your name below if you agree to take part in the focus group discussion.

_____

Date: _____

Sign below if you agree to be audiotaped during the interview.

_____

Background questions

1. How long have you worked as a ... [position] at this school?
   - ☐ 10 years or less
   - ☐ 11 - 20 years
   - ☐ 21 - 30 years
   - ☐ 31 years or more

2. How long have you worked as a ... [position]l at this school and other schools?
   - ☐ 10 years or less
   - ☐ 11 - 20 years
   - ☐ 21 - 30 years
   - ☐ 31 years or more

3. What is your exact title? _____

4. Teaching

   4.1. Do you have a teaching certificate?
   - ☐ Yes
   - ☐ No

   If the answer is yes:

   4.2. Are you currently teaching at this school?
   - ☐ Yes
   - ☐ No

   If the answer is yes:

   4.3. Which subject(s) are you currently teaching at this school?
   - ☐ Computer and Library Science
   - ☐ English, World & Classical Languages
   - ☐ History (Including Economics, Geography, Philosophy, Psychology, Religion)
   - ☐ Mathematics and Science
   - ☐ Other

   4.4. How many classes are you currently teaching? _____

   4.5. How many class periods per week are you teaching? _____

Appendix 2. Informed consent form for students

FOCUS GROUP DISCUSSION: INFORMED CONSENT FORM

Title of Study:	***Classroom Teachers' Conceptions and Practices of Information Literacy Teaching***
Principal Investigator:	*Nathalie Mertes, Ph.D. candidate, Berlin School of Library and Information Science, Humboldt University, Germany*
Co-Principal Investigators:	*Prof. Dr. Konrad Umlauf, Berlin School of Library and Information Science, Humboldt University, Germany* *Prof. Dr. Ross J. Todd, Rutgers, The State University of New Jersey, US*

Dear Student,

You are invited to take part in this conversation today which is part of my study. My name is Nathalie Mertes, I am a doctoral candidate at the Berlin School of Library and Information Science at Humboldt University in Germany. I am investigating what classroom teachers think about teaching information location, evaluation and use to their students, and how they teach it.

I will collect data at your school through a questionnaire on Professional Development Day, from documents, from interviews with individual teachers and other staff members and from today's discussion, which is called a focus group.

I am interested in hearing about your 9th to 12th grade teachers and how they have taught you to find, evaluate and use information. We will explore three themes, and we will spend 15 minutes on each theme. There are no right or wrong answers to the questions I will ask, and I welcome all responses. Each of us has a unique perspective and point of view and I am interested in hearing all of you.

Our conversation today is confidential. In my report and in conference presentations no names will be revealed. All data will be stored securely.

Before you agree to participate, you should know enough about the study to make an informed decision. Do not hesitate to ask questions about the study. Please feel free to contact me during my onsite visits or via email at n.mertes@student.hu-berlin.de, or to contact my faculty advisors, Prof. Dr. Konrad Umlauf at konrad.umlauf@ibi.hu-berlin.de and Prof. Dr. Ross Todd at rtodd@rutgers.edu

Your participation in this study is voluntary. You may choose not to participate, and you may also choose not to answer any question with which you are not comfortable.

The information you provide will lead to increased knowledge about the teaching of information location, evaluation and use in schools. I would be happy to share the findings with you after the research is completed.

Thank you for your time and for your contribution.

A copy of this consent form will be given to you for your records.

Write your name below if you agree to take part in the focus group discussion.
_____

Date: _____

Sign below if you agree to be audiotaped during the focus group discussion.
_____

Background questions

1. Name and first name: _____ _____

2. In which grade are you currently? _____

3. In which of the following grades were you a student at [Malotha School] (Please circle.)

   9 10 11

4. Please describe yourself as a student in 2-3 sentences:

Appendix 3. Informed consent form for teachers

INTERVIEW: INFORMED CONSENT FORM

Title of Study:	***Classroom Teachers' Conceptions and Practices of Information Literacy Teaching***
Principal Investigator:	*Nathalie Mertes, Ph.D. Candidate, Berlin School of Library and Information Science, Humboldt University, Germany*
Co-Principal Investigators:	*Prof. Dr. Konrad Umlauf, Berlin School of Library and Information Science, Humboldt University, Germany* *Prof. Dr. Ross J. Todd, Rutgers, The State University of New Jersey, US*

Dear Teacher,

You are invited to participate in an interview, which is being conducted as part of my doctoral studies at the Berlin School of Library and Information Science at Humboldt University in Germany, and in partnership with Rutgers University in New Jersey. The purpose of the study is to gain a deeper understanding of classroom teachers' conceptions of, and practices in, the teaching of information location, evaluation and use. This will help us to develop teaching strategies and training opportunities for teachers and school librarians.

Data will be collected through a questionnaire at Professional Development Day, through interviews and from documents. You are invited to take part in an interview that will last between 45 and 60 minutes. The questions relate to student learning, teaching and collaboration with the school library.

This research is confidential. Your name will not be associated with the findings in any way, and only the investigator will know your identity. In published reports and conference presentations, group results will be presented and any illustrative quotations that are used will not enable you to be identified. All study data will be stored securely.

Before you agree to participate, you should know enough about the study to make an informed decision. Do not hesitate to ask questions about the study before or during the interview. Please feel free to contact me during my onsite visits or via email at n.mertes@student.hu-berlin.de, or to contact my faculty advisors, Prof. Dr. Konrad Umlauf at konrad.umlauf@ibi.hu-berlin.de and Prof. Dr. Ross Todd at rtodd@rutgers.edu .

Your participation in this study is voluntary. You may choose not to participate, and you may also choose not to answer any question with which you are not comfortable. There are no costs involved in participating in this research, and you will receive no compensation. The research presents minimal risk - for example, loss of the time it takes to participate in the interview. However, the information you provide will lead to increased knowledge about teachers' conceptions and practices regarding the teaching of information location, evaluation and use. I would be happy to share the findings with you after the research is completed.

Thank you for your time and for your contribution. A copy of this consent form will be given to you for your records.

Write your name below if you agree to be interviewed.

_____

Date: _____

Sign below if you agree to be audiotaped during the interview

_____

Background questions

1. How long have you worked as a teacher in this school and other schools?
   - ☐ 10 years or less
   - ☐ 11 - 20 years
   - ☐ 21 - 30 years
   - ☐ 31 years or more

2. Which subject(s) are you currently teaching at this school? Check all that apply.
   - ☐ Computer Science and Library Science
   - ☐ English, World & Classical Languages
   - ☐ History (Including Economics, Geography, Philosophy, Psychology, Religion)
   - ☐ Mathematics and Science
   - ☐ Other

3. In which of the following big research projects have you been involved?
   - ☐ Grade 9: Research and Writing Project
   - ☐ Grade 10: American Studies Research
   - ☐ Grade 11: Scientific Literature Review
   - ☐ None of these.

4. Have you assigned other big research projects to your students? *(For example, this could be a research project that takes several weeks or a term to complete.)*
   - ☐ Yes.
   - ☐ No.

5. Have you ever used other teaching strategies (than big research projects) to help students become effective locators, evaluators and users of information in the subject(s) you teach?
   - ☐ Yes.
   - ☐ No.

6. Have you ever worked with the school library?
   - ☐ Yes.
   - ☐ No.

Appendix 4. Guide for interviews with administrators

INTERVIEW GUIDE

(For interviews with administrators)

Date:

Place:

Time:

File name on voice recorder:

Introductory script

Thank you for agreeing to be interviewed for this research study, which is being conducted as part of my doctoral studies at the Berlin School of Library and Information Science at Humboldt University in Germany, and in partnership with Rutgers University in New Jersey. It investigates classroom teachers' conceptions of, and practices in, the teaching of information location, evaluation and use.

Data was/will be collected through a questionnaire on Professional Development Day, from documents and from interviews. The questions in this interview focus on student learning, on teaching and on collaboration between classroom teachers and the school library. The interview will provide a richer context to the questionnaire, documents and other interviews, and lead to an increased understanding of information literacy teaching in schools.

This research is confidential. Your name will not be associated with the findings in any way, and only the investigator will know your identity. The interview will take between 45 and 60 minutes. You may choose not to answer a particular question if you feel uncomfortable about answering it.

[Inviting the interview participant to read and sign the consent form.]

Please indicate whether you agree/do not agree to be audiotaped. *[If permission is granted:]* Since you agreed on the consent form to be audiotaped, I will be taping the interview.

[Turning on digital voice recorder and testing it.]

Themes

The goal is to produce a rich body of data expressed in respondents' own words and context. The semi-structured interviews will address the following themes:

Theme 1: What do classroom teachers think about student learning of information location, evaluation and use?
The focus of this question is on teachers' conceptions of student information literacy learning, and specifically on the importance teachers give to it and on student learning outcomes regarding information location, evaluation and use.

Theme 2: How do classroom teachers teach information location, evaluation, and use?
The focus of this question is on identifying and explaining teaching and assessment strategies teachers use to help their students become effective locators, evaluators and users of information.

Theme 3:

In the interview with the school librarian:

If at all, what does the school library offer teachers in order to support them in their teaching of information location, evaluation and use?
The focus of this question is on identifying dimensions of infrastructure, personnel, services, instruction, and training opportunities the school library provides in order to help teachers in their information literacy teaching.

In interviews with the other administrators:

If at all, how does the school support teachers in their teaching of information location, evaluation and use?
The focus of this question is on identifying dimensions of school infrastructure, organization, curriculum and training opportunities that help teachers in their information literacy teaching.

Theme 4: If at all, how do teachers collaborate with the school library in the teaching of information location, evaluation and use?
The focus of this question is on identifying and explaining how teachers use dimensions of library infrastructure, personnel, services and instruction in their information literacy teaching.

Probes and follow-up questions

The following probes and follow-up questions may be used to explore a theme in greater depth:

To get more information
- Silence.
- Smiling.
- Nodding.
- Mm, …
- Can you tell me more about that? Could you say something more about that?
- Can you describe more … ? Can you give a more detailed description of …?
- Would you explain further?
- Explain how this happens.

To get more focused information
- Could you specify how …?
- Could you give some examples of what you are saying?
- Do you have further examples of this?
- Tell me about a time when ...

- How does this take place / happen in the school?
- Who does this?
- What do teachers consider as facilitators/barriers?
- What is most difficult/easiest for teachers?

<u>To get clarification/Interpreting answers</u>
(Rephrasing an answer)
- I understand that the meaning of what you have just said is ...
- You feel that …?
- You find that …?
- You then mean that …?
- When you say …., do you then mean/think of …?
- When you mention importance of doing/-ing ..., are you thinking of …?
- Does the expression … cover what you have just expressed?

<u>To break off long answers that are irrelevant to the study</u>
- Briefly stating my understanding of an answer, and then say: ”I would now like to introduce another topic: …”

In each of these themes, specific aspects like: differences between departments and/or groups of teachers; differences between teachers who assign “big” research projects and teachers who use other teaching strategies to teach information location, evaluation and use; etc. may come up. The interviewer will look for these, and further probe: What is the evidence for this? Would you describe any differences?

<u>Closing script</u>

Is there anything else you want to say before we end this interview?

Thank you for participating in this interview. Your time and the information you shared are appreciated.

[Turning off digital voice recorder.]

Appendix 5. Guide for the focus group discussion with students

FOCUS GROUP GUIDE

(For focus group discussion with students)

Date:

Place:

Time:

File name on voice recorder:

Introductory script

Hello everyone.

Thanks for taking part in this conversation today.

My name is Nathalie Mertes. Like you I am a student, I am a doctoral candidate at the Berlin School of Library and Information Science at Humboldt University in Germany. I am trying to understand what classroom teachers think about teaching information location, evaluation and use to their students, and how they teach it.

I will collect data at your school through a questionnaire on Professional Development Day, from documents, from interviews with individual teachers and other staff members and from today's discussion, which is called a focus group.

I am interested in hearing about your 9^{th} to 12^{th} grade teachers and how they taught you to find, evaluate and use information. We will explore three themes, and we will spend 15 minutes on each theme. There are no right or wrong answers to the questions I will ask, and I welcome all responses. Each of us has a unique perspective and point of view and I am interested in hearing all of you.

Here are the ground rules.

This is an open and safe form. Our conversation today is confidential. In my report and in conference presentations no names will be revealed.

[Inviting the participants to read and sign the consent form.]

Please indicate whether you agree/do not agree to be audiotaped. *[If permission is granted:]* Since you agreed on the consent form to be audiotaped, I will be taping the focus group discussion.

We will speak one at a time, without interruptions. Please be patient with fellow group members. Since I am taping the session, it is important for one person to speak at a time. Please resist the temptation to have side conversations. I ask you to be an active listener and participant.

[Turning on digital voice recorder and test it.]

Themes

The goal is to produce a rich body of data expressed in respondents' own words and context. The semi-structured discussion will address the following themes:

Theme 1: Looking back since 9th grade, can you tell me what your classroom teachers think about student learning of information location, evaluation and use?
The focus of this question is on teachers' conceptions of student information literacy learning, and specifically on the importance teachers give to it and on student learning outcomes regarding information location, evaluation and use.

Theme 2: Looking back since 9th grade, can you tell me how your classroom teachers have taught you how to locate, evaluate and use information?
The focus of this question is on identifying and explaining teaching and assessment strategies teachers use to help their students become effective locators, evaluators and users of information.

Theme 3: Looking back since 9th grade, could you describe how your classroom teachers have collaborated with the school library in order to teach you how to locate, evaluate and use information?
The focus of this question is on identifying and explaining how teachers use dimensions of library infrastructure, personnel, services and instruction in their information literacy teaching.

Probes and follow-up questions

The following probes and follow-up questions may be used to explore a theme in greater depth:
- What is the first thing that springs to mind?
- Can you tell me more about that?
- Give an example from your own experience?
- Explain how this happens.
- Who can build on this last idea?
- Building on this idea, what are some other alternatives?
- Let me hear some other perspectives on this
- Tell me about a time when ...
- What do teachers consider as facilitators/barriers?
- What is most difficult/easiest for teachers?
- Describe experience where you encountered difficulty and how it was addressed by teacher
- If some people are silent: Let's see, I haven't heard from ***
- What am I missing?
- Before we move on, let's hear any more burning thoughts that you have to get out
- Summarizing : From all that you have heard, list the 3 most important things …; why do you think these are the most important?

In each of the themes, specific aspects like: topic selection, student reactions and feelings, development of deep knowledge and deep understanding, differences between subjects, differences between "big" research projects and other teaching strategies, the teachers' and the school librarian's role etc. may come up. The moderator will look for these, and further probe: Would you describe further? How did teachers address this?

Closing script

Is there anything else you want to say before we end this focus group discussion?

Thank you for participating in this focus group discussion.

[Turning off digital voice recorder.]

Appendix 6. Guide for interviews with teachers

INTERVIEW GUIDE

(For interviews with teachers)

Date:

Place:

Time:

File name on voice recorder:

Introductory script

Thank you for agreeing to be interviewed for this research study, which is being conducted as part of my doctoral studies at the Berlin School of Library and Information Science at Humboldt University in Germany, and in partnership with Rutgers University in New Jersey. It investigates classroom teachers' conceptions of, and practices in, the teaching of information location, evaluation and use.

Data was/will be collected through a questionnaire on Professional Development Day, from documents and from interviews. The questions in this interview focus on student learning, on teaching and on collaboration with the school library. The interview will provide a richer context to the questionnaire and documents, and help to develop a clearer picture of teachers' conceptions and practices regarding the teaching of information location, evaluation and use.

This research is confidential. Your name will not be associated with the findings in any way, and only the investigator will know your identity. The interview will take between 45 and 60 minutes. You may choose not to answer a particular question if you feel uncomfortable about answering it.

[Inviting the interview participant to read and sign the consent form.]

Please indicate whether you agree/do not agree to be audiotaped. *[If permission is granted:]* Since you agreed on the consent form to be audiotaped, I will be taping the interview.

[Turning on digital voice recorder and testing it.]

Themes

The goal is to produce a rich body of data expressed in respondents' own words and context. The semi-structured interviews will address the following themes:

Theme 1: How do you teach information location, evaluation, and use?
The focus of this question is on identifying and explaining teaching and assessment strategies teachers use to help their students become effective locators, evaluators and users of information.

Possible prompts*

*(*These prompts will be used only if teachers start talking about these issues.)*

- Think of one of the research projects you assigned. Identify title, grade, course, time needed. Describe how you taught it.
- Describe how you taught the different sections. What were the easiest sections to teach? What were the most difficult sections to teach? How did you address your difficulties?
- How did you address students' difficulties?
- How did you address students' emotions?
- Describe how you assessed the project.
- What are barriers to assigning big research projects? What would facilitate assigning big research projects?
- Could you describe other teaching strategies you have used to help students become effective information locators, evaluators and users?

Theme 2: What do you think about student learning of information location, evaluation and use?
The focus of this question is on teachers' conceptions of student information literacy learning, and specifically on the importance teachers give to it and on student learning outcomes regarding information location, evaluation and use.

Possible prompts*

- As you observed students during the research project, what did they learn?
- What did students perceive as most difficult in the whole process?
- Tell me about students' emotional journey.
- Describe a student who was a good information locator, evaluator and user in the project.
- Explain how important student learning of information location, evaluation and use is to you.

Theme 3: If at all, how do you collaborate with the school library in the teaching of information location, evaluation and use?
The focus of this question is on identifying and explaining how teachers use dimensions of library infrastructure, personnel, services and instruction in their information literacy teaching.

Possible prompts*

- Describe how you worked with the school library in the research project.
- What was the school librarian's role? What was your role?
- What were the benefits of collaboration?
- What has prevented you from working with the school library? What has facilitated working with the school library?

- In an ideal collaboration between classroom teachers and the school library, what would be the role of the teacher, what would be the role of the school librarian?

Probes and follow-up questions

The following probes and follow-up questions may be used to explore a theme in greater depth:

To get more information
- Silence.
- Smiling.
- Nodding.
- Mm, …
- Can you tell me more about that? Could you say something more about that?
- Can you describe more … ? Can you give a more detailed description of …?
- Explain how this happens.

To get more focused information
- Could you specify how …?
- Do you have further examples of this?
- Tell me about a time when ...

To get clarification/Interpreting answers
(Rephrasing an answer)
- You feel that …?
- You find that …?
- You then mean that …?
- When you say …., do you then mean/think of …?
- Does the expression … cover what you have just expressed?

To break off long answers that are irrelevant to the study
- Briefly stating understanding of an answer, and then saying: ”I would now like to introduce another topic: …”

In each of these themes, specific aspects like: the use of information technology; differences between “big” research projects and other teaching strategies to teach information location, evaluation and use; differences between types of courses (AP, honors, ordinary) and subjects etc. may come up. The interviewer will look for these, and further probe: What is the evidence for this? Would you describe any differences? What is the connection to the teaching of information location, evaluation and use?

Closing script

Is there anything else you want to say before we end this interview?

Thank you for participating in this interview. Your time and the information you shared are appreciated.

[Turning off digital voice recorder.]

Appendix 7. Handout with themes for teachers during interviews

INTERVIEW THEMES

Theme 1: **If at all, how do you teach information location, evaluation, and use?**

Theme 2: **What do you think about student learning of information location, evaluation and use?**

Theme 3: **If at all, how do you collaborate with the school library in the teaching of information location, evaluation and use?**

Appendix 8. Contact summary form

CONTACT SUMMARY FORM

Type of contact	With whom	Place	Date	Time
☐ Formal meeting/interview ☐ Phone call ☐ Informal meeting ☐				

Themes/Questions

1. **What were the main issues or questions in this contact?**

1	
2	
3	
4	
5	
6	

2. **Summary of the information I got on each of the questions/issues I had for this contact**

Question/Issue	Information
1	
2	
Anything else that struck me as salient, interesting, illuminating or important in this contact?	

3. **What new (or remaining) questions do I have in considering the next contact with the site?**

Appendix 9. Document summary form

DOCUMENT SUMMARY FORM

Site:

Number of Document:

Type of document	Received from/Context	Date received
Author	**Audience**	**Date edited/published**

Brief summary of contents

Information	ISSUES

Anything that struck me as salient, interesting, illuminating or important in this document?

Appendix 10. Questionnaire

Q U E S T I O N N A I R E

Title of Study:	***Classroom Teachers' Conceptions and Practices of Information Literacy Teaching***
Principal Investigator:	*Nathalie Mertes, Ph.D. Candidate, Berlin School of Library and Information Science, Humboldt University, Germany*
Co-Principal Investigators:	*Prof. Dr. Konrad Umlauf, Berlin School of Library and Information Science, Humboldt University, Germany* *Prof. Dr. Ross J. Todd, Rutgers, The State University of New Jersey, US*

Dear Teacher,

You are invited to participate in this survey, which is being conducted as part of my doctoral studies at the Berlin School of Library and Information Science at Humboldt University in Germany, and in partnership with Rutgers University in New Jersey. The purpose of the study is to gain a deeper understanding of classroom teachers' conceptions of, and practices in, the teaching of information location, evaluation and use. This will help us to develop teaching strategies and training opportunities for teachers and school librarians.

During my visit at your school, I will collect data through this questionnaire, through interviews and from documents such as subject curricula. You are invited to take part by answering the questionnaire. Because I know that you have a busy, important schedule, it has been made as brief as possible. It will take about 20 minutes to complete.

Your name will not appear on the survey. The collected data will be kept strictly confidential and all responses will be stored securely. No reference will be made to you in any report that could link you to the study. I will be happy to share the findings with you after the research is completed.

If you have questions at any time about the study or its procedures, you may contact me during my **on-**site visits or via email at n.mertes@student.hu-berlin.de, or contact my faculty advisors, Prof. Dr. Konrad Umlauf at konrad.umlauf@ibi.hu-berlin.de and Prof. Dr. Ross Todd at rtodd@rutgers.edu**.**

Thank you for your time and for your contribution.

Part 1: Background information.

1. What is the total length of time you have worked as a teacher in this school and other schools?
   - ☐ 10 years or less
   - ☐ 11 - 20 years
   - ☐ 21 - 30 years
   - ☐ 31 years or more

2. Which subject(s) are you currently teaching in this school? *(Check more than one if necessary.)*
    - ☐ Computer Science and Library Science
    - ☐ English, World & Classical Languages
    - ☐ History (Including Economics, Geography, Philosophy, Psychology, Religion)
    - ☐ Mathematics and Science
    - ☐ Other

Part 2: This section focuses on your conceptions of students as effective information locators, evaluators and users.

3. Please describe your picture of a student who is an effective locator of information. Record as many ideas as you like.

4. Please describe your picture of a student who is an effective evaluator of information. Record as many ideas as you like.

5. Please describe your picture of a student who is an effective user of information. Record as many ideas as you like.

Part 3: This section concentrates on your teaching of information location, evaluation and use.

6. Have you ever assigned what you would call a "big" research project to your students? *(For example, this could be a research project that takes several weeks or a term to complete.)*

☐ Yes.

☐ No.

If NO, please continue with Question 7.

If YES, please continue here:

6.1. What kind(s) of big research projects have you assigned to your students?

6.2. How do your big research projects help your students become effective locators, evaluators and users of information?

7. Have you ever used other teaching strategies (than big research projects) to help students become effective locators, evaluators and users of information in the subject(s) you teach?

☐ Yes.

☐ No.

If NO, please continue with Question 8.

If YES, please continue here:

7.1. Which other teaching strategies (than big research projects) have you used to help your students become effective locators, evaluators and users of information?

7.2. How do these other teaching strategies help your students become effective locators, evaluators and users of information?

Part 4: This section deals with your collaboration with the school library in the teaching of information location, evaluation and use.

8. Have you ever worked with the school library?
   - ☐ Yes.
   - ☐ No.

   If NO, please continue with Question 11.

   If YES, please continue here:

9. How, if at all, have you worked with the school library in big research projects? Briefly describe.

10. How, if at all, have you worked with the school library when you used other teaching strategies to help students become effective locators, evaluators and users of information? Briefly describe.

11. Think of your own experiences. What facilitates working with the school library?

12. Think of your own experiences. What are barriers to working with the school library?

13. If there is anything else you would like to tell me regarding the learning and teaching of information location, evaluation and use, please do so here:

Thank you very much for your contribution!

Appendix 11. Schedule of professional day at Malotha

(Professional development day for all teachers from the school's 3 divisions: lower, middle and high school)

8:15 AM	Teacher and staff appreciation breakfast, organized by Malotha parent organization
9:20 AM	Questionnaire for high school teachers
10:00 AM	Keynote address about the use of IT in education
12:15 PM	Lunch
1:15 PM	First Workshop Session*
2:00 PM	Second Workshop Session*

*(*Workshops were presented by Malotha teachers and dealt with the use of IT in teaching)*

Appendix 12. E-Mail with request for member check

Dear Ms./Mr. ....,

I would like to thank you again for having participated in my study.

Please find attached the transcript of your interview. The transcription was done by an audio typist, I double-ckecked it, corrected errors and filled in blanks. Before I am going to start with a thorough analysis, I would like to make sure that the information reported in the transcript is accurate. May I, therefore, ask you, to proofread the transcript and check if there is anything that you would like to change and if there is anything that you would like to add? **Would you please highlight any changes and/or additions in red?**

As I explained to you on the day of the interview, this research is confidential. Your name will not be associated with the findings in any way, and I am the only one who will know your identity. In published reports and conference presentations, group results will be presented and any illustrative quotations that are used will not enable you to be identified. All study data will be stored securely.

May I ask you to send me your feedback within the next two weeks?

Thank you very much.

Best regards,

Nathalie

Appendix 13. Transcription rules for questionnaires

Abbreviations

QT1	Questionnaire Teacher 1
[l.l. …]	[looks like *+ word*]
[… h.i.]	[handwriting indecipherable for one word]
NoAnsw	No answer
NA	Not applicable

List-style answers

Bulleted lists, dashed lists, etc. were transcribed as a continuous text:

- When list items were key words and/or phrases, they were separated by a semicolon in the transcript.
- When list items were full sentences, they were separated by a period in the transcript.

For numbered lists, numbers were transcribed: "(1) Recognizes that ... (2) Cross checks ..."

Symbols for "and", "with" and "between"

The word "and" was used for "+" and "ε"
The word "with" was used for "w/".
The word "between" was used for "b/w".

Underlines, circles, arrows

[circled]	After the word that was circled
[underlined]	After the word that was underlined
[underlined, with double line]	After the word that was underlined with a double line
[arrow towards]	Between the two parts of speech between which the arrow was placed

Spelling

Short forms of longer words (nag., info., etc.) were transcribed as such.
Spelling mistakes were transcribed as such.

Appendix 14. Transcription rules for interviews

Based on Gibbs (2007), Kuckartz (2010), and Kvale and Brinkmann (2009)

Conversational features

- The interviews were transcribed verbatim, in a "fluent written style" (Kvale & Brinkmann, 2009)
- Verbal tics, like "er", "erm", "you know", "well", etc., were ignored.
- Repetitions like "I think ... I think ..." were omitted and transcribed as "I think".
- Abbreviations like "isn't", "I'd" etc. were transcribed as such.
- Direct speech was transcribed with quotation marks. For example:

  Speaker2: And then the teacher might say, "Do you have any books on ...?", and I would answer, "Yes, of course. They are over there."

- The interviewer agreeing to what an interview participant said ("Yeah", "I see", etc.) was not transcribed as long as it did not interrupt the interviewee's flow of speech.
- Speakers overlapping each other were transcribed as follows:

  Speaker 1: Can you think of...

  Speaker 2: I don't understand.

  Speaker 1: ...a teacher who was involved in this project.

- Unfinished sentences were transcribed with "-":

  Speaker 2: And then I went- Afterwards I realized that I should go to the classroom.

  or

  Speaker 1: Did you ask the-

  Speaker 2: Yes, and I was surprised when I heard the answer.

- The abbreviation “s.l.” (sounds like) was used for words that were hardly discernible.
- “[... tape unclear]” was used for parts of speech that were indiscernible
- Nonverbal expressions, like “pauses, emphases in intonation, and emotional expressions like laughter and sighing” (Kvale & Brinkmann, 2009) were not transcribed.

Format

- Double spacing between speakers
- Interview questions were written in bold

Identification of participants

- R Researcher
- ITA Interviewee Teacher A
- IAA Interviewee Administrator A
- FGDS1 Focus Group Discussion Student 1

Changes and additions from member check

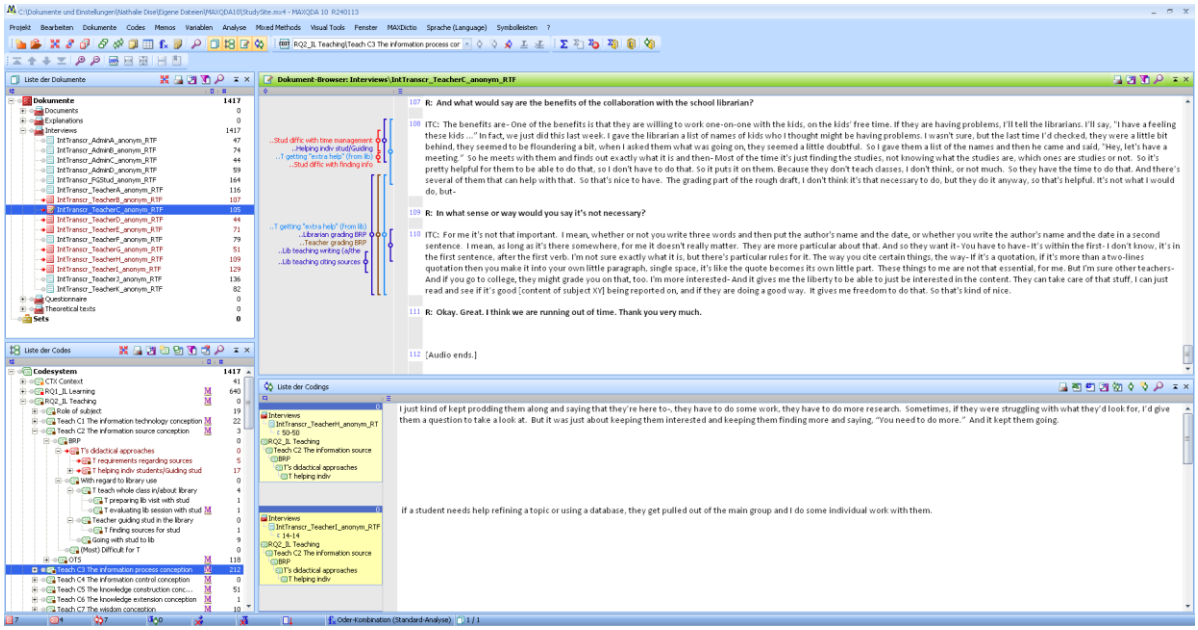
- Add: *(MC changed: ...)* For parts in the transcript that were altered by the interview participant during member check
- Add: *(MC added: ....)* For parts in the transcript that were added by the interview participant during member check

Appendix 15. Anonymization rules

Name of the school	Malotha School
Study participants	Questionnaire participants: In transcripts: QT1 (Questionnaire Teacher 1), QT2, etc. In report: QT1or Teacher 1 Interview participants: In transcripts: IAA (Interviewee Administrator A), IAB, etc. – in report: Administrator A In transcripts: ITA (Interviewee Teacher A), ITB, etc. – In report: Teacher A In transcripts: FGDS1 (Focus Group Discussion Student 1), FGDS2, etc. – in report: Student 1
Names of people from the school	First Name XY Last Name XY; First Name XY; Mr. XY; and if possible, information about the person was added in squared brackets, for example, "First Name XY [School Librarian]", "Mr. XY [Teacher]"
Rooms etc. in the school	Building XY; Class XY; Room XY
Names of universities, libraries, etc.; cities	Institute XY at University XY; Library XY; Museum XY; City XY
The extended (big) projects in grades 9, 10, and 11	BRP9, BRP10, BRP11
Title of other projects, people studied in projects, names of websites or databases used, title of courses, etc.*	Painter XY or [name of painter] or painter [name]; Website XY; Title XY; Language XY or [in a language course]
Time data	e.g., Month XY/Day XY/ Year XY; Day XY; Month XY; Season XY Break

Note. * In order to ensure anonymity within the school

Appendix 16. Screenshot of coding procedure with computer program



Appendix 17. Description of information literacy categories

This appendix gives an overview of the information literacy categories that were identified during the analytical process. Categories are broader concepts under which lower-level concepts are grouped (Corbin & Strauss, 2008, p. 159); properties and dimensions of concepts were identified using the type of conceptually-ordered matrices as described in Appendix 19. Based on the data and enhanced by the literature (Chapter 2) and especially Bruce's (1997) information literacy model, seven categories of information literacy emerged out of the data; participants themselves referred to them in the first place as competencies and to a lesser extent as transferable concepts. These are the seven categories:

(1) Completion of a process composed of sequences of steps

When study participants referred to extended research tasks as the completion of a process, they described it as going through various interrelated steps, stages, or phases, as completing different parts and creating intermediate products, not only an end product. The number of steps varied from five to ten. It was also described as a linear approach where one step prepares the next. Reasons for its use included structuring the project, and breaking it into steps so that it is more manageable.

(2) Information Technology (IT) Use

Study participants talked about the use of information technology in the form of computers, including mobile ones, such as laptops, notebooks, tablets, smart phones, but also other types of technology, such as digital projectors. Reasons for the use of information technology were the following: information finding, for example, on the web, in databases, or through the school's intranet; information presentation, for example, using presentation software, using electronic templates, and emailing papers to teachers; storing and organizing information; and using information technology in all phases of the research process. The places for the use of information technology were the school in general and more precisely the classroom, the library, computer labs in the library or in other parts of the school, and the student's home.

(3) Information finding

The following subcategories of sources, which are presented here in alphabetical order, emerged out of the data:

Books: Predominantly print; mainly non-fiction; available in the library and to a lesser extent in the classroom (the teacher's own collection).

Databases: Especially those available at Malotha library. Teachers referred to them as offering access to pre-selected, high-quality electronic information, predominantly in the form of peer-reviewed journals, and to a lesser extent to other types of media.

Human sources: Individuals in general, teachers, peers, family members, experts, all of whom could be accessed through informal conversations or formal interviews.

Museum, archives: Collections or exhibitions of valuable objects that are devoted to a particular topic, for example, to paintings and photographs or to a particular artist. Found in the community or beyond and accessed onsite or online.

Popular periodical sources: Newspapers and magazines, both electronic and print.

School library sources: An overarching term used by participants for the sources available in a variety of formats at the Malotha High School library, for example, print, electronic, and visual format.

Textbooks: Manuals of instruction, including anthologies in history classes, and a manual about the research process as such for BRP11.

Visual sources: Pictures, images, and photographs, all of which were either online or to a lesser extent in print. Also video clips and film which were predominantly online but also accessed "physically" by going to a cinema.

Web sources: An overarching term used by participants for sources available on the internet as well as for sources of differing quality, for example, university websites as opposed to blogs or free-content online encyclopedias, such as Wikipedia.

(4) Information control

Study participants did not explicitly mention controlling information but they referred to it indirectly as storing information in an organized way. It could include pieces of information that students would have gathered or produced, the latter could include, for example, intermediate products, rough drafts, and the final version of end products. Storage and organization could occur in binders, for printed materials, or electronically, for example, using

a computer file manager. Participants referred to storage devices as research logs or portfolios.

(5) Knowledge building

Using information for building new knowledge or extending existing knowledge, which includes four subcategories:

> Evaluation: Thinking critically about sources and information within sources; criteria participants mentioned included, in alphabetical order: accuracy, authenticity, authority, authorship, bias, credibility, currency, deciding what is enough, degree of difficulty, integrity, intention, legitimacy, objectivity, perspective, pertinence, relevancy, reliability, type of source, usefulness, validity, variety, veracity
>
> Engagement: In the form of reading, used for printed and electronic information, making use of various types and strategies of reading; in the form of viewing, for example, pictures, films, or artifacts in museums; in the form of listening, for example, through informal conversations or formal interviews; includes cognitive processing of information for gaining comprehension and making meaning.
>
> Extracting: In the form of identifying and highlighting the main points; taking notes; summarizing; requires thinking and reflecting.
>
> Analysis and development of a personal perspective: Formulating a personal focus (at the beginning of the research process); developing a thesis; formulating and supporting an argument; comparing for differences and similarities; gaining and integrating differing perspectives; making connections; combining new information and prior knowledge; thinking critically; thinking creatively; transferring information and knowledge to other tasks, classes or the world outside school, over time.

(6) Ethical use of information

Study participants referred to ethical use of information in the sense of crediting and documenting sources; avoiding plagiarism; the use of direct quotations or paraphrasing; writing bibliographies; the use of specific formats, for example, MLA.

(7) Presentation of information

Presenting information in research tasks was reported in the following formats, which are presented here in alphabetical order: creative format, for example artifacts or a TV show; electronic format, for example, creating a website; oral format, including an oral argument in a debate class, or leading a discussion; visual format, for example posters, a timeline, or graphs; written format, such as papers, essays, or short stories. Participants also talked about structuring presentations, for example, by developing an outline; adapting them to particular audiences; being articulate; developing and revising drafts

These categories were used for exploring and describing teachers' conceptions of student information literacy learning (section 4.2) and their (inter)actions in the process of information literacy teaching (sections 4.3, 4.4 and 4.5).

Appendix 18. Decision rules for data entry in matrices

- From administrators with teaching assignments using only what they say in their role as administrators about their faculty, not what they report about their own teaching activities
- Using contradictory data and making contradictions explicit
- In conceptually ordered matrices writing quotes, labels, short summarizing phrases, or a combination of those in cells. In role-ordered matrices writing numbers, concepts, or quotes, or a combination of those in cells.
- Entering anonymized IDs (for example, QT1, Administrator A) together with concepts, quotes, labels, short summarizing phrases.
- In summarizing role-ordered matrices for whole-class teaching and individual assistance: writing cell entries for administrators, students, and teachers from questionnaires, if at least one participant of the group addressed it; displaying data for all interviewed teachers individually
- If there is no data available from a group/an individual participant, leaving the cell empty

Appendix 19. Development of a conceptually-ordered matrix

A major step in the analytical process was the development of matrices that helped to identify the properties and dimensions of concepts. The example below shows how data from the various sources was used for identifying the properties and dimensions of the category "research tasks". The matrix lists quotes or short, summarizing phrases together with anonymized IDs; the accompanying text also contains the exact references to the lines in the transcripts where the relevant piece of data can be found.

Example of a Conceptually-ordered Matrix: Dimensions and Properties of Research Tasks

Properties	**Dimensions**	
	Extended research tasks	**Small-scale research tasks**
Size of Product	"Huge research paper" (Student 1, 3) "very long ... essay" (Teacher J) "an extensive paper" (Teacher K) "an eight to ten-page paper" (Teacher A) "a 20 page paper or a 15 page paper" (Admin B); "a 25- to 30-page research paper" (Student 1) "20 pages, 30 pages, 40 pages" (Teacher C) 60 minute presentation and discussion (Teacher H) "a four-page website" (Teacher F)	"a 1- to 2-page essay" (Student 1) One page paper (Teacher G) "Little reports" (Teacher A) Brief oral report (Teacher D, E) - Presentation taking 5 minutes (Teacher E) Poster (Teacher E)
(Class) Time	Long-term projects (Teacher F) "Takes up the majority of the year" (Student 3) Taking "lots of class time" (Teacher A) One period per week (Admin B; Teacher B, F) "semester-long to monthly work" (QT19) "a month" with students working on it every period (Teacher H) Between a month or two with students working on it one or two periods per week (Teacher J) Eight weeks (Teacher I)	Spontaneous research (Student 6; Teacher G) In daily teaching (Admin A, C, D) Short investigation (Teacher D, G) - 15 minutes (Teacher D) Students working on it mainly outside classroom (Teacher E) Project taking three weeks (Teacher B) "A week or two" or "over a weekend" or during a seasonal break (Teacher E)

From interviews with administrators and students (External perspective)

Administrators and students distinguished between extended and small-scale research tasks in terms of time needed to complete them and size of end products. With regard to time, Administrator B

reported about an extended project on which students worked during one period per week (Administrator B, par. 114) over eight weeks. Students referred to one of these projects as “a big project ... that takes up the majority of the year” (Student 3, par. 289). Small-scale tasks were described as being part of daily teaching (Administrator A, par. 35; Administrator C, par. 21; Administrator D, par. 44) and taking place spontaneously in the classroom setting (Student 6, par. 49). As far as the size of the end product is concerned, Administrator B reported about an extended project that resulted in “a 20 page paper or a 15 page paper” (Admin B, par. 126). Students noted that that they had to write a paper that “is so big” (Student 1, par. 269), a “huge research paper” (Student 1, par. 296; Student 3, par. 285) of 25 to 30 pages (Student 1, par. 269) as opposed to short papers of one to two pages (Student 1, par. 296).

From teacher questionnaires and interviews (Internal perspective)

From questionnaires

In questionnaires teachers referred to extended research projects as “term papers“ (QT17, par. 7), “semester-long to monthly work” (QT19, par. 13) and “large research projects” (QT23, par. 10). When they were asked which strategies other than the assignment of extended research projects they have applied in order to teach information location, evaluation, and use (Appendix 10, Question 7.1), teachers reported about different types of small-scale research tasks. Although the term “other teaching strategies” was used in order to keep the question open, teachers explicitly referred to these strategies as “short” and “small” projects: “short papers“ (QT1, par. 10), “short, specific research assignments” (QT2, par. 10), “small projects“ (QT6, par. 10), and “small-scale activities“ (QT9, par. 10).

From interviews

Teachers described research tasks in terms of the (class) time that was needed to complete them and the size of end products. They claimed that extended research projects are time-consuming. Teacher A noted, “We're giving lots of class time” (Teacher A, par. 44). Teacher B and Teacher F reported about a project on which students worked during one period per week (Teacher B, par. 42; 54; Teacher F, par. 43) over eight weeks. Teacher F called this type “long-term projects” (Teacher F, par. 27). Teacher H noted, “It took a long time, I think it took a month” (Teacher H, par. 48) during which students worked every period on the project (Teacher H, par. 76). The big project in which Teacher I was involved took eight weeks (Teacher I, par. 88). Teacher J stated first that the project he assigned “took a long time. I think it was about a month or so that we spent on doing this project amongst studying other things” (Teacher J, par. 22) and then later “I believe it took a month and a half, a month and a half I would say, maybe two” (Teacher J, par. 44); then he provided even more detailed information:

“And we would maybe spend, even though it was broken up into chunks of time throughout the week, maybe one or two class periods the entire week on this” (Teacher J, par. 44). Teacher B described a small research project that lasted three weeks (Teacher B, par 150-168) and Teacher D one for which the research phase in the library took “15 minutes” (Teacher D, par. 25). Teacher E described short projects for which students work outside the classroom mainly, noting that they “have like maybe a week or two to do this or over a weekend or- ... One year I assigned this, they could do it over Season ... break” (Teacher E, par. 32). To higher performing students he assigns a different type of small research tasks requiring them to deal with a problem at home that he has not explicitly addressed in class (Teacher E, par. 127). Teacher G described a “spontaneous kind of research”, where students search for the information “in a very short, I would say ‘concise way’, it’s not a long investigation” (Teacher G, par. 19).

Research projects that are “extended” with regard to end products, were described by teachers as resulting in “an eight to ten-page paper” (Teacher A, par. 41), “20 pages, 30 pages, 40 pages” (Teacher C, par. 78), a presentation and discussion lead by the student that takes 60 minutes (Teacher H, par. 42) or “a four-page website” (Teacher F, par. 19), and a “very long” (Teacher J, par. 20) or “extensive” (Teacher K, par. 23) paper. End products in small-scale research tasks were described as “little reports” (Teacher A, par. 50) or brief oral reports. (Teacher D, par. 25). Teacher E stated, “So, I have assigned projects, not big research projects, smaller projects” (Teacher E, par. 12), which resulted in a poster (Teacher E, par. 22) or in presentations that took five minutes (Teacher E, par. 23, par. 40). Teacher G stated that he assigned a spontaneous research task that resulted in a paper that was “not very long, like one page“ (Teacher G, par. 21).

Summary

Study participants described research tasks in terms of time needed to complete them and size of end products. Based on participants’ descriptions the following definitions were developed: Extended projects take a month or more to accomplish and result in at least an eight- to ten-page paper, a four-page website or a 30-minute presentation. All other projects were qualified as small-scale.

Appendix 20. Development of a role-ordered matrix

A major step in the analytical process was the development of matrices that helped to organize the data according to the roles of study participants. The example below shows a detailed matrix that was developed in order to gain an overview of types and elements of information presentation encompassed in research tasks as reported by teachers in interviews. In the matrix anonymized IDs are used, and the accompanying text contains the exact references to the lines in the transcripts where the relevant piece of data can be found as well as several exemplary quotes.

Example of a Role-ordered Matrix: Information Presentation in Research Tasks (Teacher Interviews)

Perspective	**Role**	**Types and elements of presentation**	
		In extended research tasks	**In small-scale research tasks**
Internal	**Teacher** *(Interviews)*	Using written format (Teacher A, B, C, F, I, J, K)	Written format (Teacher A, B, E, G)
		Revising: Writing rough drafts (Teacher A, C, I, J) Not requiring students to hand in rough drafts (Teacher H)	Oral format (Teacher A, D, E, H), including leading discussions (Teacher H)
			Creative format: "creative ways" (Teacher B); TV show (Teacher H)
		Using oral format (Teacher A, B, H)	Visual format: Posters (Teacher E)
		Electronic presentation (Teacher F)	
		Structuring presentation (Teacher A, B, I, J)	
		Adapting presentation to audience (Teacher H)	

The type of student presentation teachers mentioned most often was writing. Seven teachers (Teacher A, B, C, F, I, J, K) reported about extended projects in which students presented the results in written form, as a paper or an essay (Teacher A, par. 41; Teacher B, par. 54; Teacher C, par. 17; Teacher F, par. 43, Teacher I, par. 22; Teacher J, par. 20; Teacher K, par. 26). Four Teachers (Teacher A, B, E, G) reported about small research tasks for which students presented information in written format (Teacher A, par. 15; Teacher B, par. 152; Teacher E, par. 129; Teacher G, par. 19-21).

Oral format was mentioned by three teachers (Teacher A, B, H) for presentations in extended projects (Teacher A, par. 41; Teacher B, 136-140; Teacher H, par. 38) and by four teachers (Teacher A, D, E, H) in small-scale research (Teacher A, par. 15; Teacher D, 15, 25; Teacher E, par. 23, 40). Teacher H noted

that after doing oral presentations his students lead class discussions about their topics (Teacher H, par. 13, par. 18).

The only other way of presenting teachers reported for extended research was doing it electronically; Teacher F had his students do so (Teacher F, par. 19). In the context of small research tasks, teachers required students to do visual presentations in the form of posters (Teacher E, par.22; 31) or to use creative formats. Teacher B had students present information in a variety of ways, verbal and nonverbal (Teacher B, par. 84-86). He reported about a project where students had to present information in the form of a timeline (Teacher B, par. 118) and another project where doing "something creative" was one of the options (Teacher B, par. 152). Teacher H described a project in which he planned to have students present their information in a TV show format (Teacher H, par. 68).

In the context of extended research, four teachers (Teacher A, C, I, J) reported about requiring students to go through a revision process; they had them submit draft versions of their papers (Teacher A, par. 52; Teacher C, par. 87; Teacher I, par. 88; Teacher J, par. 22). Teacher J used a revision process during which not only the teachers but also fellow students read and made comments on draft versions:

> It was this constant, "I write something,"-, the students write something, give it to me, I make comments on it, I give it back to them, they have to change it, they give it to another student, the students make further comments, give it back to them, and they have to change it. (Teacher J, par. 66)

Teacher H dealt with it in a different way. He explained that he did not want students to formally hand in any draft versions, noting:

> I know, in some cases, if it's like paper writing, you grade like a rough draft or a second draft and then a final draft. But I rather just give them feedback on what they're doing and take the emphasis off on kind of what grade they're getting or how they are being evaluated. (Teacher H, par. 50)

Four teachers (Teacher A, B, I, J) talked about wanting students to structure the information they extracted. Teacher A has students do an outline (Teacher A, par. 43). Teacher B and Teacher I claimed that in their extended research projects students learn to write a paper that has a "proper structure" (Teacher I, par. 56) or a "scientific structure ...: Does this follow this follow this follow this, does this have evidence?" (Teacher B, par. 68). Teacher B further stated:

> They've learned how to construct a paper, I guess, a paper that flows, a paper that has some kind of purpose behind it, a paper that's easy to grade. Because, I guess, when you go to

> college, professors want to grade a paper that they can just read and it's kind of chronological and it follows a pattern rather than it's all over the place. (Teacher B, par. 88)

Teacher J required his students to develop a thesis as a basis for the structure of their essay (Teacher J, par. 37-40). One teacher (Teacher H) said that he wanted students to adapt their presentation to their audience. In the project that he assigned the intended audience was a group of younger students and he explicitly stated that his students learned to adapt their presentation to this particular audience (Teacher H, par. 72).

Appendix 21. Development of a summarizing role-ordered matrix

After detailed matrices had been developed (as described in Appendix 20) for each of the roles, a summarizing role-ordered matrix was realized that allowed triangulation of findings. The example below shows the matrices that were developed in order to identify types and elements of information presentation encompassed in research tasks: first the external perspective as reported by administrators and students (Table A1), then the internal perspective as reported by teachers in questionnaires (Table A2) and interviews (Table A3) and finally the summarizing display (Table A4). The detailed matrices contain anonymized IDs, concepts, and sometimes quotes, whereas the summarizing matrix only contains numbers.

Table A1: Information Presentation in Research Tasks (External Perspective)

Perspective	**Role**	**Types and elements of presentation**	
		In extended research tasks	**In small-scale research tasks**
External	**Administrators**	Using written format (Admin B)	(Language teacher) Oral format (Admin B) (History teacher) Visual format (Admin B)
	Students	Using written format (Student 1, 3, 5)	(Language teachers) Written format (Student 1, 2)

Table A2: Information Presentation in Research Tasks (Teacher Questionnaires)

Perspective	**Role**	**Types and elements of presentation**	
		In extended research tasks	**In small-scale research tasks**
Internal	**Teacher** *(Questionnaire)*	Written format (QT1, QT2, QT4, QT5, QT7, QT17, QT18, QT19, QT20; QT26)	Written format (QT1, QT12, QT14, QT17, QT19)
		Visual format (QT14, QT17, QT22)	Visual format (QT6, QT12)
		Oral format (QT7)	Oral format (QT4, QT5, QT6, QT14)
		Electronic format (QT14)	Electronic format (QT12, QT14, QT19, QT22)
		Creative format (QT17; QT20)	Creative format (QT12)
		Structuring (QT4, QT20)	
		Revising (QT4, QT18)	

Table A3: Information Presentation in Research Tasks (Teacher Interviews)

Perspective	Role	Types and elements of presentation	
		In extended research tasks	**In small-scale research tasks**
Internal	**Teacher** *(Interviews)*	Using written format (Teacher A, B, C, F, I, J, K)	Written format (Teacher A, B, E, G)
		Revising: Writing rough drafts (Teacher A, C, I, J)	Oral format (Teacher A, D, E, H), including leading discussions (Teacher H)
		Not requiring students to hand in rough drafts (Teacher H)	Creative format: "creative ways" (Teacher B); TV show (Teacher H)
		Using oral format (Teacher A, B, H)	Visual format: Posters (Teacher E)
		Electronic presentation (Teacher F)	
		Structuring presentation (Teacher A, B, I, J)	
		Adapting presentation to audience (Teacher H)	

Table A4: Information Presentation in Research Tasks (Summary)

Perspective	**Types of Presentation / Role**	**Written format**	**Oral format**	**Visual format**	**Electronic format**	**Creative format**
External	**Administrators**	**1/4**	**1/4**	**1/4**	**0/4**	**0/4**
	Students	**4/6**	**0/6**	**0/6**	**0/6**	**0/6**
Internal	**Teachers** *(Questionnaires)*	**11/21**	**5/21**	**5/21**	**4/21**	**3/6**
	Teachers *(Interviews)*	**9/11**	**5/11**	**1/11**	**1/11**	**2/11**

Appendix 22. The case study database

Data collection technique	Material	Format
Questionnaire	The questionnaire (drafts and final version)	Electronic (Word) file and print
	From professional development day: Teacher invitation; schedule; overview of workshops	Print
	Field notes from implementation	Handwritten and electronic (Word) file
	30 Questionnaires with participants' answers	Handwritten
	Transcription rules	Electronic (Word) file and print
	A chart of all transcripts: 2 drafts and a final version	Electronic: Excel charts; Print versions of drafts only
	Anonymization rules	Electronic (Word) file and print
	The anonymized chart of transcripts	Electronic: Excel and a copy imported into MAXQDA
	7 Charts developed during analysis	Electronic: Excel
	Chart with coded transcripts	Electronic (As part of a "project" in MAXQDA)
Interviews	Interview guides: drafts and 16 copies of final version	Electronic (Word) file and print
	21 Informed consent forms signed by participants	Print
	5 Handouts with interview themes	Electronic (Word) file and print
	4 Charts with overview of interview participants (developed for ensuring maximum variation)	Electronic (Word) file and print
	16 Recordings	Electronic (WMA) files
	Field notes from the 16 interviews	Handwritten
	16 Contact summary forms	Electronic (Word) files and print
	4 Charts with background information about participants, one anonymized	Electronic (Excel) file and print
	Transcription rules	Electronic (Word) files and print
	Correspondence with transcription service	E-Mails: electronic and print
	Different versions of the 16 transcripts: initial version written by typist (= V1), version 1 reviewed by investigator (= V2), version 2 reviewed by interview participant (= V3), combination of versions 2 and 3 (= V4)	Electronic (Word) files and print
	Anonymization rules	Electronic (Word) file and print
	16 Anonymized transcripts	Electronic: Word files and a copy of each imported into MAXQDA; print
	Criteria for member check	Electronic (Word) files
	Correspondence from member check	Electronic (E-Mails) and print
	List with feedbacks from member check	Electronic (Word) file and print
	Coded transcripts	Electronic (MAXQDA)
	32 Drafts developed during analysis	Electronic (Word) files
Informal conversations	Field notes from 6 meetings	Handwritten
	Contact summary forms of the 6 meetings	Electronic (Word) files and print
	Field notes from 16 informal conversations	Handwritten
	Contact summary forms of 16 informal conversations	Electronic (Word) files and print

Documents	Downloads of all pages of the school's website and all files available	Electronic (Pdf) files and print
	Summary of the various sections of the school's website	Handwritten
	Course catalog report	Print
	School's daily schedule	Print
	3 Copies of the school's magazine	Print
	4 Subject curricula	Print
	Library map	Print
	List with database subscriptions	Print
	Documents about BRP9, BRP11	Print
	Documents about a research project, Teacher A	Print
	Document about a research project, Teacher B	Print
	Documents about a course and research projects, Teacher I	Print
	Documents about research projects, Teacher J	Print
	Scans of selected documents	Electronic (Word) files
	23 Document summary forms	Electronic (Word) files and print
	4 Drafts of data-gathering plan, one anonymized	Electronic (Word) file and print
	Correspondence with key informants	Electronic (E-Mails) and print
Other	14 drafts of the project about the present study in MAXQDA	Electronic (MAXQDA)
	5 drafts of the project about the present study in Citavi (literature and memos)	Electronic (Citavi)
	8 drafts of the report	Electronic (Word) files and print
	Pilot study data base	Electronic and print

All the above materials are stored on the investigator's private computer for electronic versions and in an ordinary file cabinet at the home office of the investigator for print copies.

Appendix 23. Evaluation tool. Details of extended research projects

Project number*: ..... **Project title**: .....

Teacher: ..... **Grade:** ..... **Subject**: .....

Unit: .....

Subject-related objectives:

- .....
- .....
- .....

** As noted in the list (Table 5-1)*

Objectives related to information literacy:

IL Concepts and Competencies	Objectives
Execution of a process	
Use of information technology	
Finding of information	
Control of information	
Knowledge building	
Ethical use of information	
Presentation of information	

Pedagogical strategies (whole class teaching and individual assistance, including assessment strategies):

Roles of teacher and librarian:

Appendix 24. Evaluation tool. IL of individual students

Name of student:

Extended research projects (ERP) undertaken by the student:

ERP	Date of submission	Title	Class	Teacher	Subject
A					
B					
C					
...					

Information literacy concepts and competencies developed by the student and her/his strengths and weaknesses

IL Concepts and Competencies	ERP	IL concepts and competencies developed by the student	Student's strengths and weaknesses
Execution of a process	*e.g., A*		
Use of information technology			
Finding of information			
Control of information			
Knowledge building			
Ethical use of information			
Presentation of information			

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Declaration of Honesty/Selbständigkeitserklärung

Hiermit erkläre ich, dass ich die vorliegende Dissertation selbstständig und ohne Benutzung anderer als der angegebenen Hilfsmittel angefertigt habe.

Die aus fremden Quellen direkt oder indirekt übernommenen Gedanken sind als solche kenntlich gemacht.

Die Dissertation wurde bisher weder im Inland noch im Ausland in gleicher oder ähnlicher Form einer anderen Prüfungsbehörde vorgelegt oder veröffentlicht.

Berlin, den 19.12.2013

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